TIC900.ST25.txt

SEQUENCE LISTING

<110> Monsanto Technology LLC

Donovan, Judith C

Donovan, William P

Engleman, James T

Malvar, Thomas M

Pitkin, John W

<120> Secreted Insecticidal Protein and Gene Compositions From Bacillus thuringiensis and Uses Therefor

<130> 38-21(52949)

<150> 60/529,917

<151> 2003-12-16

<160> 32

<170> PatentIn version 3.1

<210> 1

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<213> Bacillus thuringiensis

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Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
            20                  25                  30

att ggt atg tcc att gta tct gaa ctt att ggt atg att cca ggc gga      144
Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
        35                  40                  45

aca gct ttg caa ttt gtg ttt aat caa ttg tgg tct cgt tta ggt gat      192
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    50                  55                  60

tct gga tgg aat gcg ttc atg gaa cat gtg gag gaa tta att gat act      240
Ser Gly Trp Asn Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65                  70                  75                  80

aaa ata gaa ggg tat gca aaa aat aaa gcc tta tct gaa tta gca ggt      288
Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
                85                  90                  95

ata caa aga aac ctt gaa aca tat ata caa tta cgt aat gaa tgg gaa      336
Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
            100                 105                 110

aat gat att gaa aac tca aag gct caa ggt aag gta gct aat tac tat      384
Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
        115                 120                 125

gaa agt ctt gag cag gcg gtt gaa agg agt atg cct caa ttt gca gtg      432
Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
    130                 135                 140

ggg aat ttt gaa gta cca ctt tta act gtt tat gtg caa gct gct aat      480
Gly Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145                 150                 155                 160

ctt cat tta tta tta tta aga gat gtt tca gtt tat gga aag cgt tgg      528
Leu His Leu Leu Leu Leu Arg Asp Val Ser Val Tyr Gly Lys Arg Trp
                165                 170                 175

gga tgg tcg gag cag aaa att aaa att tat tat gat aga cag att aag      576
Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Arg Gln Ile Lys
            180                 185                 190

tat acc cat gaa tac aca aat cat tgt gta aat tgg tat aat aaa gga      624
Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
        195                 200                 205

ctt gag aga tta aaa aat aaa ggt tct tct tat caa gat tgg tac aat      672
Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
    210                 215                 220

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Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225                 230                 235                 240

gct tta ttc ccg cac tat gat gta caa act tat cca ata aca acc gtt      768
Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
                245                 250                 255

gct cag tta aca agg gaa gtt tat acg gat cct tta ctt aat ttt aat      816
Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
            260                 265                 270
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cct aaa tta cat tct gtg tct caa tta cct agt ttt agt gac atg gaa      864
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Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
    290                 295                 300

aca att tat aca gat tgg tat agt gtg gga aga aac tat tat tgg gga      960
Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305                 310                 315                 320

gga cat cgc gtg acg tct tac cat gta gga gga gag aat ata aga tca     1008
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                325                 330                 335

cct cta tat ggt aga gag gca aat caa gag gtt cct aga gat ttt tat     1056
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Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
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    370                 375                 380

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Gly Val Glu Phe His Thr Ser Thr Gly Ser Phe Met Tyr Arg Glu Arg
385                 390                 395                 400

gga tcg gta gat tct ttt aat gag tta ccg cct ttt aat cca gtt ggg     1248
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        435                 440                 445

aca cat cgt agt gct gaa gaa acc aat aca att gaa tca aat att att     1392
Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
    450                 455                 460

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                485                 490                 495

ggt cct gga aca ttt gga gat atg aga ata aat att aat gca cca tta     1536
Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
            500                 505                 510

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Ser Glu Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
        515                 520                 525

caa ttt gtc acg agt att aat ggg gcc acc att aat att ggt aac ttc     1632
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aca gta tcg ttt agt act cca ttt agt ttc tca aat gca caa agc ata     1728
Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
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ttt aga tta ggt ata caa gca ttt tct gga gtt caa gaa gtt tat gtg     1776
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Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
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Thr Ala Leu Gln Phe Val Phe Asn Gln Leu Trp Ser Arg Leu Gly Asp
    50                  55                  60

Ser Gly Trp Asn Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65                  70                  75                  80

Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
                85                  90                  95

Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
            100                 105                 110

Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
        115                 120                 125

Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
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Gly Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
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Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
195 200 205

Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
210 215 220

Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
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Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
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Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
260 265 270

Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
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Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
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Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
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Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
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Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
340 345 350

Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
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Gly Val Glu Phe His Thr Ser Thr Gly Ser Phe Met Tyr Arg Glu Arg
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Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
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Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp

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Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
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Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
485 490 495

Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
500 505 510

Ser Glu Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
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Gln Phe Val Thr Ser Ile Asn Gly Ala Thr Ile Asn Ile Gly Asn Phe
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Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser Glu Gly Tyr Arg
545 550 555 560

Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
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Asp Lys Ile Glu Phe Ile Pro Val Glu
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Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
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att ggt atg tcc att gta tct gaa ctt att ggt atg att cca ggc gga      144
Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
        35                  40                  45

aca gct ttg caa ttt gtg ttt aat caa ttg tgg tct cgt tta ggt gat      192
Thr Ala Leu Gln Phe Val Phe Asn Gln Leu Trp Ser Arg Leu Gly Asp
    50                  55                  60

tct gga tgg aat gcg ttc atg gaa cat gtg gag gaa tta att gat act      240
Ser Gly Trp Asn Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65                  70                  75                  80

aaa ata gaa ggg tat gca aaa aat aaa gcc tta tct gaa tta gca ggt      288
Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
                85                  90                  95

ata caa aga aac ctt gaa aca tat ata caa tta cgt aat gaa tgg gaa      336
Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
            100                 105                 110

aat gat att gaa aac tca aag gct caa ggt aag gta gct aat tac tat      384
Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
        115                 120                 125

gaa agt ctt gag cag gcg gtt gaa agg agt atg cct caa ttt gca gtg      432
Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
    130                 135                 140

gag aat ttt gaa gta cca ctt tta act gtc tat gtg caa gct gct aat      480
Glu Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145                 150                 155                 160

ctt cat tta tta tta tta aga gat gtt tca gtt tat gga aag tgt tgg      528
Leu His Leu Leu Leu Leu Arg Asp Val Ser Val Tyr Gly Lys Cys Trp
                165                 170                 175

gga tgg tcg gag cag aaa att aaa att tat tat gat aaa cag att aag      576
Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Lys Gln Ile Lys
            180                 185                 190

tat acc cat gaa tac aca aat cat tgt gta aat tgg tat aat aaa gga      624
Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
        195                 200                 205

ctt gag aga tta aaa aat aaa ggt tct tct tat caa gat tgg tac aat      672
Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
    210                 215                 220

tat aat cgt ttc cgt aga gaa atg act ctt act gtt tta gat atc gtt      720
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225                 230                 235                 240

gct tta ttc ccg cac tat gat gta caa act tat cca ata aca acc gtt      768
Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
                245                 250                 255

gct cag cta aca agg gaa gtt tat acg gat cct tta ctt aat ttt aat      816
Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
            260                 265                 270

cct aaa tta cat tct gtg tct caa tta cct agt ttt agt gac atg gaa      864
Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
        275                 280                 285

aat gca aca att aga act cca cat ctg atg gaa ttt tta aga atg cta      912
Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
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305                 310                 315                 320

gga cat cgc gtg acg tct tac cat gta gga gga gag aat ata aga tca     1008
Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
                325                 330                 335

cct cta tat ggt aga gag gca aat caa gag gtt cct aga gat ttt tat     1056
Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
            340                 345                 350

ttt tat gga ccc gtt ttt aag acg tta tca aag ccg act cta aga cca     1104
Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
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    370                 375                 380

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Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Met Tyr Arg Glu Arg
385                 390                 395                 400

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Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
                405                 410                 415

tta cct cat aag gta tac agt cac cgt tta tgt cat gca acg ttt gtt     1296
Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
            420                 425                 430

cgt aaa tct ggg acc cct tat tta aca aca ggt gcc atc ttt tct tgg     1344
Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp
        435                 440                 445

aca cat cgt agt gct gaa gaa acc aat aca att gaa tca aat att att     1392
Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
    450                 455                 460

acg caa atc ccg tta gta aaa gca tat caa att ggg tca ggc act act     1440
Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465                 470                 475                 480

gta agg aaa gga cca gga ttc aca gga ggg gat ata ctt cga aga aca     1488
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                485                 490                 495

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            500                 505                 510

tct caa aga tat cgt gta agg att cgt tat gct tct acg aca gat tta     1584
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        515                 520                 525

caa ttt gtc acg agt att aat ggg acc acc att aat att ggt aac ttc     1632
Gln Phe Val Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
    530                 535                 540

ccg aaa act att aat aat cta aat act tta ggt tct gag ggc tat aga     1680
Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser Glu Gly Tyr Arg
545                 550                 555                 560

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                565                 570                 575
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Ser Gly Trp Asn Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
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Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
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Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
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Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
115 120 125

Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
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Glu Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145 150 155 160

Leu His Leu Leu Leu Leu Arg Asp Val Ser Val Tyr Gly Lys Cys Trp
165 170 175

Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Lys Gln Ile Lys
180 185 190

Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
195 200 205

Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
210 215 220

Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225 230 235 240

Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
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Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
260 265 270

Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
275 280 285

Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
290 295 300

Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305 310 315 320

Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
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Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
340 345 350

Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
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Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
370 375 380

Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Met Tyr Arg Glu Arg
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Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
405 410 415

Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
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Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp
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Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465 470 475 480

Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
485 490 495

Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
500 505 510

Ser Gln Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
515 520 525

Gln Phe Val Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
530 535 540

Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser Glu Gly Tyr Arg
545 550 555 560

Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
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20 25 30

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Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
35 40 45

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aca gct ttg caa ttt gtg ttt aat caa ttg tgg tct cgt tta ggt gat      192
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    50                  55                  60

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Ser Gly Trp Asn Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65                  70                  75                  80

aaa ata gaa ggg tat gca aaa aat aaa gcc tta tct gaa tta gca ggt      288
Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
                85                  90                  95

ata caa aga aac ctt gaa aca tat ata caa tta cgt aat gaa tgg gaa      336
Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
            100                 105                 110

aat gat att gaa aac tca aag gct caa ggt aag gta gct aat tac tat      384
Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
        115                 120                 125

gaa agt ctt gag cag gcg gtt gaa agg agt atg cct caa ttt gca gtg      432
Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
    130                 135                 140

ggg aat ttt gaa gta cca ctt tta act gtc tat gtg caa gct gct aat      480
Gly Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145                 150                 155                 160

ctt cat tta tta tta tta aga gat gtt tca gtt tat gga aag cgt tgg      528
Leu His Leu Leu Leu Leu Arg Asp Val Ser Val Tyr Gly Lys Arg Trp
                165                 170                 175

gga tgg tcg gag cag aaa att aaa att tat tat gat aaa cag att aag      576
Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Lys Gln Ile Lys
            180                 185                 190

tat acc cat gaa tac aca aat cat tgt gta aat tgg tat aat aaa gga      624
Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
        195                 200                 205

ctt gag aga tta aaa aat aaa ggt tct tct tat caa gat tgg tac aat      672
Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
    210                 215                 220

tat aat cgt ttc cgt aga gaa atg act ctt act gtt tta gat atc gtt      720
Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225                 230                 235                 240

gct tta ttc ccg cac tat gat gta caa act tat cca ata aca acc gtt      768
Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
                245                 250                 255

gct cag cta aca agg gaa gtt tat acg gat cct tta ctt aat ttt aat      816
Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
            260                 265                 270

cct aaa tta cat cct gtg tct caa tta cct agt ttt agt gac atg gaa      864
Pro Lys Leu His Pro Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
        275                 280                 285

aat gca aca att aga act cca cat ctg atg gaa ttt tta aga atg cta      912
Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
    290                 295                 300

aca att tat aca gat tgg tat agt gtg gga aga aac tat tat tgg gga      960
Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305                 310                 315                 320

gga cat cgc gtg acg tct tac cat gta gga gga gag aat ata aga tca     1008
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Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
                325                 330                 335

cct cta tat ggt aga gag gca aat caa gag gtt cct aga gat ttt tat      1056
Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
            340                 345                 350

ttt tat gga ccc gtt ttt aag acg tta tca aag ccg act cta aga cca      1104
Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
        355                 360                 365

tta cag cag cct gca cca gct cct cct ttt aat tta cgt agc tta gag      1152
Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
    370                 375                 380

gga gta gaa ttc cac act cct aca ggt agt ttt atg tat cgt gaa aga      1200
Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Met Tyr Arg Glu Arg
385                 390                 395                 400

gga tcg gta gat tct ttt aat gag tta ccg cct ttt aat cca gtt ggg      1248
Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
                405                 410                 415

tta cct cat aag gta tac agt cac cgt tta tgt cat gca acg ttt gtt      1296
Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
            420                 425                 430

cgt aaa tct ggg acc cct tat tta aca aca ggt gcc atc ttt tct tgg      1344
Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp
        435                 440                 445

aca cat cgt agt gct gaa gaa acc aat aca att gaa tca aat att att      1392
Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
    450                 455                 460

acg caa atc ccg tta gta aaa gca tat caa att ggg tca ggc act act      1440
Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465                 470                 475                 480

gta agg aaa gga cca gga ttc aca gga ggg gat ata ctt cga aga aca      1488
Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
                485                 490                 495

ggt cct gga aca ttt gga gat atg aga ata aat att aat gca cca tta      1536
Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
            500                 505                 510

tct caa aga tat cgt gta agg att cgt tat gct tct acg aca gat tta      1584
Ser Gln Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
        515                 520                 525

caa ttt gtc acg agt att aat ggg acc acc att aat att ggt aac ttc      1632
Gln Phe Val Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
    530                 535                 540

cca aaa act att aat aat cta aat act tta ggt tct gag ggc tat aga      1680
Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser Glu Gly Tyr Arg
545                 550                 555                 560

aca gta tcg ttt agt acc cca ttt agt ttc tca aat gca caa agc ata      1728
Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
                565                 570                 575

ttt aga tta ggt ata caa gca ttt tct gga gtt caa gaa gtt tat gtg      1776
Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val
            580                 585                 590

gat aaa att gaa ttt att cct gtt gaa                                 1803
Asp Lys Ile Glu Phe Ile Pro Val Glu
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595 600

<210> 8

<211> 601

<212> PRT

<213> Bacillus thuringiensis

<400> 8

Met Asn Ser Lys Glu His Asp Tyr Leu Lys Val Cys Asn Asp Leu Ser
1 5 10 15

Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
20 25 30

Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
35 40 45

Thr Ala Leu Gln Phe Val Phe Asn Gln Leu Trp Ser Arg Leu Gly Asp
50 55 60

Ser Gly Trp Asn Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65 70 75 80

Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
85 90 95

Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
100 105 110

Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
115 120 125

Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
130 135 140

Gly Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145 150 155 160

Leu His Leu Leu Leu Leu Arg Asp Val Ser Val Tyr Gly Lys Arg Trp
165 170 175

Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Lys Gln Ile Lys
180 185 190

Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
195 200 205

Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
210 215 220

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Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225                 230                 235                 240

Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
                245                 250                 255

Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
            260                 265                 270

Pro Lys Leu His Pro Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
        275                 280                 285

Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
    290                 295                 300

Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305                 310                 315                 320

Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
                325                 330                 335

Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
            340                 345                 350

Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
        355                 360                 365

Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
    370                 375                 380

Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Met Tyr Arg Glu Arg
385                 390                 395                 400

Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
                405                 410                 415

Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
            420                 425                 430

Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp
        435                 440                 445

Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
    450                 455                 460

Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465                 470                 475                 480

Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
                485                 490                 495
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Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
500 505 510

Ser Gln Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
515 520 525

Gln Phe Val Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
530 535 540

Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser Glu Gly Tyr Arg
545 550 555 560

Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
565 570 575

Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val
580 585 590

Asp Lys Ile Glu Phe Ile Pro Val Glu
595 600

<210> 9

<211> 1803

<212> DNA

<213> Bacillus thuringiensis

<220>

<221> CDS

<222> (1)..(1803)

<223> TIC404

<400> 9

atg aat tca aag gaa cat gat tat cta aaa gtt tgt aat gat tta agt 48
Met Asn Ser Lys Glu His Asp Tyr Leu Lys Val Cys Asn Asp Leu Ser
1 5 10 15

gac gcc aat att aat atg gag cgg ttt gat aag aat gat gca cta gaa 96
Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
20 25 30

att ggc atg tcc att gta tct gaa ctt att ggt atg att cca ggc gga 144
Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
35 40 45

aca gct tta caa ttt gtg ttt aat caa ttg tgg tct cgt tta ggt gat 192
Thr Ala Leu Gln Phe Val Phe Asn Gln Leu Trp Ser Arg Leu Gly Asp
50 55 60

tct gga tgg agt gca ttc atg gaa cat gtg gag gaa tta att gat act 240
Ser Gly Trp Ser Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65 70 75 80

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aaa ata gaa ggg tat gca aaa aat aaa gcc tca tct gaa tta gca ggt      288
Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Ser Ser Glu Leu Ala Gly
                85                  90                  95

ata caa aga aac ctt gaa aca tat ata caa tta cgt aat gca tgg gaa      336
Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Ala Trp Glu
            100                 105                 110

aat gat atc gaa aac tca aag gct caa ggt aag gta gct aat tac tat      384
Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
        115                 120                 125

gaa agt ctt gag cag gcg gtt gaa agg agt atg cct caa ttt gca gtg      432
Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
    130                 135                 140

ggg aat ttt gaa gta cca ctt tta act gtt tat gtg caa gct gct aat      480
Gly Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145                 150                 155                 160

ctt cat ata tta tta tta aga gat gtt cta att tac gga aag cgt tgg      528
Leu His Ile Leu Leu Leu Arg Asp Val Leu Ile Tyr Gly Lys Arg Trp
                165                 170                 175

gga tgg tcg gag cag aaa att aaa att tat tat gat aga cag att aag      576
Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Arg Gln Ile Lys
            180                 185                 190

tat act cat gaa tac aca aat cat tgt gta aat tgg tat aat aaa ggg      624
Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
        195                 200                 205

ctt gag aga tta aaa aat aaa ggt tct tct tat caa gat tgg tac aat      672
Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
    210                 215                 220

tat aat cgt ttc cgt aga gaa atg act ctt act gtt tta gat atc gtt      720
Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225                 230                 235                 240

gct tta ttc ccg cac tat gat gta caa act tat cca ata aca acc gtt      768
Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
                245                 250                 255

gct cag cta aca agg gaa gtt tat acg gat cct tta ctt aat ttt aat      816
Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
            260                 265                 270

cct aaa tta cat tct gtg tct caa tta cct agt ttt agt gac atg gaa      864
Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
        275                 280                 285

aat gca aca att aga act cca cat ttg atg gaa ttt tta aga atg tta      912
Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
    290                 295                 300

aca att tat aca gat tgg tat agt gtg gga aga aac tat tat tgg gga      960
Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305                 310                 315                 320

gga cat cgc gtg acg tct tac cat gta gga gga gag aat ata aga tcc     1008
Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
                325                 330                 335

cct cta tat ggt aga gag gca aat caa gag gtt cct aga gat ttt tat     1056
Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
            340                 345                 350
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ttt tat gga ccc gtt ttt aag acg tta tca aaa ccg act cta aga cca     1104
Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
        355                 360                 365

tta cag cag cct gca cca gct cct cct ttt aat tta cgt agc tta gag     1152
Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
    370                 375                 380

gga gta gaa ttc cac act cct aca ggt agt ttt atg tat cgt gaa aga     1200
Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Met Tyr Arg Glu Arg
385                 390                 395                 400

gga tca gta gat tct ttt aat gag tta ccg cct ttt aat cca gtt ggg     1248
Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
                405                 410                 415

tta cct cat aag gta tat agt cac cgt tta tgt cat gca acg ttt gtt     1296
Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
            420                 425                 430

cgt aaa tcg ggg acc cct tat tta aca aca ggt gcc atc ttt act tgg     1344
Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Thr Trp
        435                 440                 445

aca cat cgt agt gct gaa gaa acc aat aca att gaa tca aat att att     1392
Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
    450                 455                 460

acg caa atc ccg tta gta aaa gca tat caa att gga tcg ggc act act     1440
Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465                 470                 475                 480

gta agg aaa gga cca gga ttc acg gga ggg gat ata ctt cgg aga aca     1488
Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
                485                 490                 495

ggt cct gga aca ttt gga gat atg aaa gta aat att cat gca cca tta     1536
Gly Pro Gly Thr Phe Gly Asp Met Lys Val Asn Ile His Ala Pro Leu
            500                 505                 510

tcc caa aaa tat cgt gta agg att cgt tat gct tct acg aca gat tta     1584
Ser Gln Lys Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
        515                 520                 525

caa ttt gtc acg agt att aat gga acc acc att aat att ggt aac ttc     1632
Gln Phe Val Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
    530                 535                 540

cca aaa act act aat aat cta aat act tta ggt tct gag agc tat aga     1680
Pro Lys Thr Thr Asn Asn Leu Asn Thr Leu Gly Ser Glu Ser Tyr Arg
545                 550                 555                 560

aca gta tcg ttt agt acg cca ttt agt ttc tca aat gca caa agc ata     1728
Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
                565                 570                 575

ttt aga tta ggt ata caa gca ttt tct gga gtt caa gaa gtt tat gtg     1776
Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val
            580                 585                 590

gat aaa att gaa ttt att cct gtt gaa                                1803
Asp Lys Ile Glu Phe Ile Pro Val Glu
        595                 600
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<210> 10

<211> 601

<212> PRT

<213> Bacillus thuringiensis

<400> 10

Met Asn Ser Lys Glu His Asp Tyr Leu Lys Val Cys Asn Asp Leu Ser
1 5 10 15

Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
20 25 30

Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
35 40 45

Thr Ala Leu Gln Phe Val Phe Asn Gln Leu Trp Ser Arg Leu Gly Asp
50 55 60

Ser Gly Trp Ser Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65 70 75 80

Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Ser Ser Glu Leu Ala Gly
85 90 95

Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Ala Trp Glu
100 105 110

Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
115 120 125

Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
130 135 140

Gly Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145 150 155 160

Leu His Ile Leu Leu Leu Arg Asp Val Leu Ile Tyr Gly Lys Arg Trp
165 170 175

Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Arg Gln Ile Lys
180 185 190

Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
195 200 205

Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
210 215 220

Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225 230 235 240

Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val

245 250 255

Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
260 265 270

Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
275 280 285

Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
290 295 300

Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305 310 315 320

Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
325 330 335

Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
340 345 350

Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
355 360 365

Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
370 375 380

Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Met Tyr Arg Glu Arg
385 390 395 400

Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
405 410 415

Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
420 425 430

Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Thr Trp
435 440 445

Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
450 455 460

Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465 470 475 480

Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
485 490 495

Gly Pro Gly Thr Phe Gly Asp Met Lys Val Asn Ile His Ala Pro Leu
500 505 510

Ser Gln Lys Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
515 520 525

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Gln Phe Val Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
    530                 535                 540

Pro Lys Thr Thr Asn Asn Leu Asn Thr Leu Gly Ser Glu Ser Tyr Arg
545                 550                 555                 560

Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
                565                 570                 575

Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val
            580                 585                 590

Asp Lys Ile Glu Phe Ile Pro Val Glu
        595                 600
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<210> 11

<211> 1803

<212> DNA

<213> Bacillus thuringiensis

<220>

<221> CDS

<222> (1)..(1803)

<223> TIC961

<400> 11

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Met Asn Ser Thr Glu His Asp Tyr Leu Lys Val Cys Asn Asp Leu Ser
1               5                   10                  15

gac gcc aat att aat atg gag cgg ttt gat aag aat gat gca ctg gaa       96
Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
            20                  25                  30

att ggt atg tcc att gta tct gaa ctt att ggt atg att cca ggc gga      144
Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
        35                  40                  45

aca gct ttg caa ttt gtg ttt aat caa ttg tgg tct cgt tta ggt gat      192
Thr Ala Leu Gln Phe Val Phe Asn Gln Leu Trp Ser Arg Leu Gly Asp
    50                  55                  60

tct gga tgg aat gcg ttc atg gaa cat gtg gag gaa tta att gat act      240
Ser Gly Trp Asn Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65                  70                  75                  80

aaa ata gaa ggg tat gca aaa aat aaa gcc tta tct gaa tta gca ggt      288
Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
                85                  90                  95

ata caa aga aac ctt gaa aca tat ata caa tta cgt aat gaa tgg gaa      336
Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
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          100                 105                 110

aat gat att gaa aac tca aag gct caa ggt aag gta gct aat tac tat      384
Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
        115                 120                 125

gaa agt ctt gag cag gcg gtt gaa agg agt atg cct caa ttt gca gtg      432
Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
    130                 135                 140

ggg aat ttt gaa gta cca ctt tta act gtc tat gtg caa gct gct aat      480
Gly Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145                 150                 155                 160

ctt cat tta tta tta tta aga gat gtt tca gtt tat gga aag cgt tgg      528
Leu His Leu Leu Leu Leu Arg Asp Val Ser Val Tyr Gly Lys Arg Trp
                165                 170                 175

gga tgg tcg gag cag aaa att aaa att tat tat gat aaa cag att aag      576
Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Lys Gln Ile Lys
            180                 185                 190

tat acc cat gaa tac aca aat cat tgt gta aat tgg tat aat aaa gga      624
Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
        195                 200                 205

ctt gag aga tta aaa aat aaa ggt tct tct tat caa gat tgg tac aat      672
Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
    210                 215                 220

tat aat cgt ttc cgt aga gaa atg act ctt act gtt tta gat atc gtt      720
Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225                 230                 235                 240

gct tta ttc ccg cac tat gat gta caa act tat cca ata aca acc gtt      768
Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
                245                 250                 255

gct cag cta aca agg gaa gtt tat acg gat cct tta ctt aat ttt aat      816
Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
            260                 265                 270

cct aaa tta cat tct gtg tct caa tta cct agt ttt agt gac atg gaa      864
Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
        275                 280                 285

aat gca aca att aga act cca cat ctg atg gaa ttt tta aga atg cta      912
Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
    290                 295                 300

aca att tat aca gat tgg tat agt gtg gga aga aac tat tat tgg gga      960
Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305                 310                 315                 320

gga cat cgc gtg acg tct tac cat gta gga gga gag aat ata aga tca     1008
Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
                325                 330                 335

cct cta tat ggt aga gag gca aat caa gag gtt cct aga gat ttt tat     1056
Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
            340                 345                 350

ttt tat gga ccc gtt ttt aag acg tta tca aag ccg act cta aga cca     1104
Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
        355                 360                 365

tta cag cag cct gca cca gct cct cct ttt aat tta cgt agc tta gag     1152
Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
    370                 375                 380
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gga gta gaa ttc cac act cct aca ggt agt ttt atg tat cgt gaa aga     1200
Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Met Tyr Arg Glu Arg
385                 390                 395                 400

gga tcg gta gat cct ttt aat gag tta ccg cct ttt aat cca gtt ggg     1248
Gly Ser Val Asp Pro Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
                405                 410                 415

tta cct cat aag gta tac agt cac cgt tta tgt cat gca acg ttt gtt     1296
Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
            420                 425                 430

cgt aaa tct ggg acc cct tat tta aca aca ggt gcc atc ttt tct tgg     1344
Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp
        435                 440                 445

aca cat cgt agt gct gaa gaa acc aat aca att gaa tca aat att att     1392
Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
    450                 455                 460

acg caa atc ccg tta gta aaa gca tat caa att ggg tca ggc act act     1440
Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465                 470                 475                 480

gta agg aaa gga cca gga ttc aca gga ggg gat ata ctt cga aga aca     1488
Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
                485                 490                 495

ggt cct gga aca ttt gga gat atg aga ata aat att aat gca cca tta     1536
Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
            500                 505                 510

tct caa aga tat cgt gta agg att cgt tat gct tct acg aca gat tta     1584
Ser Gln Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
        515                 520                 525

caa ttt gtc acg agt att aat ggg acc acc att aat att ggt aac ttc     1632
Gln Phe Val Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
    530                 535                 540

cca aaa act att aat aat cta aat act tta ggt tct gag ggc tat aga     1680
Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser Glu Gly Tyr Arg
545                 550                 555                 560

aca gta tcg ttt agt act cca ttt agt ttc tca aat gca caa agc ata     1728
Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
                565                 570                 575

ttt aga tta ggt ata caa gca ttt tct gga gtt caa gaa gtt tat gtg     1776
Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val
            580                 585                 590

gat aaa att gaa ttt att cct gtt gaa                                1803
Asp Lys Ile Glu Phe Ile Pro Val Glu
        595                 600
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<210> 12

<211> 601

<212> PRT

<213> Bacillus thuringiensis

<400> 12

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Met Asn Ser Thr Glu His Asp Tyr Leu Lys Val Cys Asn Asp Leu Ser
1               5                  10                  15

Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
            20                  25                  30

Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
        35                  40                  45

Thr Ala Leu Gln Phe Val Phe Asn Gln Leu Trp Ser Arg Leu Gly Asp
    50                  55                  60

Ser Gly Trp Asn Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65                  70                  75                  80

Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
                85                  90                  95

Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
            100                 105                 110

Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
        115                 120                 125

Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
    130                 135                 140

Gly Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145                 150                 155                 160

Leu His Leu Leu Leu Leu Arg Asp Val Ser Val Tyr Gly Lys Arg Trp
                165                 170                 175

Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Lys Gln Ile Lys
            180                 185                 190

Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
        195                 200                 205

Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
    210                 215                 220

Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225                 230                 235                 240

Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
                245                 250                 255

Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
            260                 265                 270
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Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
275 280 285

Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
290 295 300

Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305 310 315 320

Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
325 330 335

Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
340 345 350

Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
355 360 365

Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
370 375 380

Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Met Tyr Arg Glu Arg
385 390 395 400

Gly Ser Val Asp Pro Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
405 410 415

Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
420 425 430

Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp
435 440 445

Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
450 455 460

Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465 470 475 480

Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
485 490 495

Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
500 505 510

Ser Gln Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
515 520 525

Gln Phe Val Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
530 535 540

Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser Glu Gly Tyr Arg

545 550 555 560

Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
565 570 575

Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val
580 585 590

Asp Lys Ile Glu Phe Ile Pro Val Glu
595 600

<210> 13

<211> 1803

<212> DNA

<213> Bacillus thuringiensis

<220>

<221> CDS

<222> (1)..(1803)

<223> TIC962

<400> 13

atg aat tca aag gaa cat gat tat cta aaa gtt tgt aat gat tta agt 48
Met Asn Ser Lys Glu His Asp Tyr Leu Lys Val Cys Asn Asp Leu Ser
1 5 10 15

gac gcc aat att aat atg gaa cgg ttt gat aag aat gat gca ctg gaa 96
Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
20 25 30

att ggt atg tcc att gta tct gaa ctt att ggt atg att cca ggc ggg 144
Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
35 40 45

aca gct ttg caa ttt gtg ttt aat caa ttg tgg tct cgt tta ggt gat 192
Thr Ala Leu Gln Phe Val Phe Asn Gln Leu Trp Ser Arg Leu Gly Asp
50 55 60

tct gga tgg aat gcg ttc atg gaa cat gtg gag gaa tta att gat gct 240
Ser Gly Trp Asn Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Ala
65 70 75 80

aaa ata gaa ggg tat gca aaa aat aaa gcc tta tct gaa tta gca ggt 288
Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
85 90 95

ata caa aga aac ctt gaa aca tat ata caa tta cgt aat gaa tgg gaa 336
Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
100 105 110

aat gat att gaa aac tca aag gct caa ggt aag gta gct aat tac tat 384
Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
115 120 125

gaa agt ctt gag cag gcg gtt gaa agg agt atg cct caa ttt gca gtg 432

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Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
    130                 135                 140

gag aat ttt gaa gta cca ctt tta act gtc tat gtg caa gct gct aat      480
Glu Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145                 150                 155                 160

ctt cat tta tta tta tta aga gat gtt tca gtt tat gga aag tgt tgg      528
Leu His Leu Leu Leu Leu Arg Asp Val Ser Val Tyr Gly Lys Cys Trp
                165                 170                 175

gga tgg tcg gag cag aaa att aaa att tat tat gat aaa cag att aag      576
Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Lys Gln Ile Lys
            180                 185                 190

tat acc cat gaa tac aca aat cat tgt gta aat tgg tat aat aaa gga      624
Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
        195                 200                 205

ctt gag aga tta aaa aat aaa ggt tct tct tat caa gat tgg tac aat      672
Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
    210                 215                 220

tat aat cgt ttc cgt aga gaa atg act ctt act gtt tta gat atc gtt      720
Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225                 230                 235                 240

gct tta ttc ccg cac tat gat gta caa act tat cca ata aca acc gtt      768
Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
                245                 250                 255

gct cag cta aca agg gaa gtt tat acg gat cct tta ctt aat ttt aat      816
Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
            260                 265                 270

cct aaa tta cat tct gtg tct caa tta cct agt ttt agt gac atg gaa      864
Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
        275                 280                 285

aat gca aca att aga act cca cat ctg atg gaa ttt tta aga atg cta      912
Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
    290                 295                 300

aca att tat aca gat tgg tat agt gtg gga aga aac tat tat tgg gga      960
Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305                 310                 315                 320

gga cat cgc gtg acg tct tac cat gta gga gga gag aat ata aga tca     1008
Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
                325                 330                 335

cct cta tat ggt aga gag gca aat caa gag gtt cct aga gat ttt tat     1056
Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
            340                 345                 350

ttt tat gga ccc gtt ttt aag acg tta tca aag ccg act cta aga cca     1104
Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
        355                 360                 365

tta cag cag cct gca cca gct cct cct ttt aat tta cgt agc tta gag     1152
Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
    370                 375                 380

gga gta gaa ttc cac act cct aca ggt agt ttt atg tat cgt gaa aga     1200
Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Met Tyr Arg Glu Arg
385                 390                 395                 400

gga tcg gta gat tct ttt aat gag ttg ccg cct ttt aat cca gtt ggg     1248
Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
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                405                 410                 415

tta cct cat aag gta tac agt cac cgt tta tgt cat gca acg ttt gtt     1296
Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
            420                 425                 430

cgt aaa tct ggg acc cct tat tta aca aca ggt gcc atc ttt tct tgg     1344
Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp
        435                 440                 445

aca cat cgt agt gct gaa gaa acc aat aca att gaa tca aat att att     1392
Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
    450                 455                 460

acg caa atc ccg tta gta aaa gca tat caa att ggg tca ggc act act     1440
Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465                 470                 475                 480

gta agg aaa gga cca gga ttc aca gga ggg gat ata ctt cga aga aca     1488
Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
                485                 490                 495

ggt cct gga aca ttt gga gat atg aga ata aat att aat gca cca tta     1536
Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
            500                 505                 510

tct caa aga tat cgt gta agg att cgt tat gct tct acg aca gat tta     1584
Ser Gln Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
        515                 520                 525

caa ttt gtc acg agt att aat ggg acc acc att aat att ggt aac ttc     1632
Gln Phe Val Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
    530                 535                 540

ccg aaa act att aat aat cta aat act tta ggt tct gag ggc tat aga     1680
Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser Glu Gly Tyr Arg
545                 550                 555                 560

aca gta tcg ttt agt act cca ttt agt ttc tca aat gca caa agc ata     1728
Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
                565                 570                 575

ttt aga tta ggt ata caa gca ttt tct gga gtt caa gaa gtt tat gtg     1776
Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val
            580                 585                 590

gat aaa att gaa ttt att cct gtt gaa                                1803
Asp Lys Ile Glu Phe Ile Pro Val Glu
        595                 600
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<210> 14

<211> 601

<212> PRT

<213> Bacillus thuringiensis

<400> 14

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Met Asn Ser Lys Glu His Asp Tyr Leu Lys Val Cys Asn Asp Leu Ser
1               5                   10                  15

Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
            20                  25                  30
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Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
35 40 45

Thr Ala Leu Gln Phe Val Phe Asn Gln Leu Trp Ser Arg Leu Gly Asp
50 55 60

Ser Gly Trp Asn Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Ala
65 70 75 80

Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
85 90 95

Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
100 105 110

Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
115 120 125

Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
130 135 140

Glu Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145 150 155 160

Leu His Leu Leu Leu Leu Arg Asp Val Ser Val Tyr Gly Lys Cys Trp
165 170 175

Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Lys Gln Ile Lys
180 185 190

Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
195 200 205

Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
210 215 220

Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225 230 235 240

Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
245 250 255

Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
260 265 270

Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
275 280 285

Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
290 295 300

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Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305                 310                 315                 320

Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
                325                 330                 335

Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
            340                 345                 350

Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
        355                 360                 365

Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
    370                 375                 380

Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Met Tyr Arg Glu Arg
385                 390                 395                 400

Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
                405                 410                 415

Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
            420                 425                 430

Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp
        435                 440                 445

Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
    450                 455                 460

Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465                 470                 475                 480

Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
                485                 490                 495

Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
            500                 505                 510

Ser Gln Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
        515                 520                 525

Gln Phe Val Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
    530                 535                 540

Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser Glu Gly Tyr Arg
545                 550                 555                 560

Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
                565                 570                 575
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Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val
580 585 590

Asp Lys Ile Glu Phe Ile Pro Val Glu
595 600

<210> 15

<211> 1803

<212> DNA

<213> Bacillus thuringiensis

<220>

<221> CDS

<222> (1)..(1803)

<223> TIC963

<400> 15

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atg aat tca aag gaa cat gat tat ata aaa gtt tgt aat gat tta agt       48
Met Asn Ser Lys Glu His Asp Tyr Ile Lys Val Cys Asn Asp Leu Ser
1               5                   10                  15

gac gcc aat att aat atg gag cgg ttt gat aag aat gat gca cta gaa       96
Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
            20                  25                  30

att ggc atg tcc att gta tct gaa ctt att ggt atg att cca ggc gga      144
Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
        35                  40                  45

aca gct tta caa ttt gtg ttt aat caa ttg tgg tct cgt tta ggt gat      192
Thr Ala Leu Gln Phe Val Phe Asn Gln Leu Trp Ser Arg Leu Gly Asp
    50                  55                  60

tct gga tgg agt gca ttc atg gaa cat gtg gag gaa tta att gat act      240
Ser Gly Trp Ser Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65                  70                  75                  80

aaa ata gaa ggg tat gca aaa aat aaa gcc tta tct gaa tta gca ggt      288
Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
                85                  90                  95

ata caa aga aac ctt gaa aca tat ata caa tta cgt aat gca tgg gaa      336
Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Ala Trp Glu
            100                 105                 110

aat gat atc gaa aac tca aag gct caa ggt aag gta gct aat tac tat      384
Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
        115                 120                 125

gaa agt ctt gag cag gcg gtt gaa agg agt atg cct caa tct gca gtg      432
Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Ser Ala Val
    130                 135                 140

ggg aat ttt gaa gta cca ctt tta act gtt tat gtg caa gct gct aat      480
Gly Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145                 150                 155                 160
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ctt cat ata tta tta tta aga gat gtt cta att tac gga aag cgt tgg      528
Leu His Ile Leu Leu Leu Arg Asp Val Leu Ile Tyr Gly Lys Arg Trp
                165                 170                 175

gga tgg tcg gag cag aaa att aaa att tat tat gat aga cag att aag      576
Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Arg Gln Ile Lys
            180                 185                 190

tat act cat gaa tac aca aat cat tgt gta aat tgg tat aat aaa ggg      624
Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
        195                 200                 205

ctt gag aga tta aaa aat aaa ggt tct tct tat caa gat tgg tac aat      672
Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
    210                 215                 220

tat aat cgt ttc cgt aga gaa atg act ctt act gtt tta gat atc gtt      720
Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225                 230                 235                 240

gct tta ttc ccg cac tat gat gta caa act tat cca ata aca acc gtt      768
Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
                245                 250                 255

gct cag cta aca agg gaa gtt tat acg gat cct tta ctt aat ttt aat      816
Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
            260                 265                 270

cct aaa tta cat tct gtg tct caa tta cct agt ttt agt gac atg gaa      864
Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
        275                 280                 285

aat gca aca att aga act cca cat ttg atg gaa ttt tta aga atg tta      912
Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
    290                 295                 300

aca att tat aca gat tgg tat agt gtg gga aga aac tat tat tgg gga      960
Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305                 310                 315                 320

gga cat cgc gtg acg tct tac cat gta gga gga gag aat ata aga tcc     1008
Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
                325                 330                 335

cct cta tat ggt aga gag gca aat caa gag gtt cct aga gat ttt tat     1056
Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
            340                 345                 350

ttt tat gga ccc gtt ttt aag acg tta tca aaa ccg act cta aga cca     1104
Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
        355                 360                 365

tta cag cag cct gca cca gct cct cct ttt aat tta cgt agc tta gag     1152
Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
    370                 375                 380

gga gta gaa ttc cac act cct aca ggt agt ttt atg tat cgt gaa aga     1200
Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Met Tyr Arg Glu Arg
385                 390                 395                 400

gga tca gta gat tct ttt aat gag tta ccg cct ttt aat cca gtt ggg     1248
Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
                405                 410                 415

tta cct cat aag gta tat agt cac cgt tta tgt cat gca acg ttt gtt     1296
Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
            420                 425                 430

cgt aaa tcg ggg acc cct tat tta aca aca ggt gcc atc ttt act tgg     1344
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Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Thr Trp
        435                 440                 445

aca cat cgt agt gct gaa gaa acc aat aca att gaa tca aat att att     1392
Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
    450                 455                 460

acg caa atc ccg tta gta aaa gca tat caa att gga tcg ggc act act     1440
Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465                 470                 475                 480

gta agg aaa gga cca gga ttc acg gga ggg gat ata ctt cgg aga aca     1488
Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
                485                 490                 495

ggt cct gga aca ttt gga gat atg aaa gta aat att cat gca cca tta     1536
Gly Pro Gly Thr Phe Gly Asp Met Lys Val Asn Ile His Ala Pro Leu
            500                 505                 510

tcc caa aaa tat cgt gta agg att cgt tat gct tct acg aca gat tta     1584
Ser Gln Lys Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
        515                 520                 525

caa ttt gtc acg agt att aat gga acc acc att aat att ggt aac ttc     1632
Gln Phe Val Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
    530                 535                 540

cca aaa act act aat aat cta aat act tta ggt tct gag agc tat aga     1680
Pro Lys Thr Thr Asn Asn Leu Asn Thr Leu Gly Ser Glu Ser Tyr Arg
545                 550                 555                 560

aca gta tcg ttt agt acg cca ttt agt ttc tca aat gca caa agc ata     1728
Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
                565                 570                 575

ttt aga tta ggt ata caa gca ttt tct gga gtt caa gaa gtt tgt gtg     1776
Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Cys Val
            580                 585                 590

gat aaa att gaa ttt att cct gtt gaa                                1803
Asp Lys Ile Glu Phe Ile Pro Val Glu
        595                 600
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<210> 16

<211> 601

<212> PRT

<213> Bacillus thuringiensis

<400> 16

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Met Asn Ser Lys Glu His Asp Tyr Ile Lys Val Cys Asn Asp Leu Ser
1               5                   10                  15

Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
            20                  25                  30

Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
        35                  40                  45

Thr Ala Leu Gln Phe Val Phe Asn Gln Leu Trp Ser Arg Leu Gly Asp
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50 55 60

Ser Gly Trp Ser Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65 70 75 80

Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
85 90 95

Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Ala Trp Glu
100 105 110

Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
115 120 125

Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Ser Ala Val
130 135 140

Gly Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145 150 155 160

Leu His Ile Leu Leu Leu Arg Asp Val Leu Ile Tyr Gly Lys Arg Trp
165 170 175

Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Arg Gln Ile Lys
180 185 190

Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
195 200 205

Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
210 215 220

Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225 230 235 240

Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
245 250 255

Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
260 265 270

Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
275 280 285

Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
290 295 300

Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305 310 315 320

Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
325 330 335

```
Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
            340                 345                 350

Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
        355                 360                 365

Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
    370                 375                 380

Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Met Tyr Arg Glu Arg
385                 390                 395                 400

Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
                405                 410                 415

Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
            420                 425                 430

Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Thr Trp
        435                 440                 445

Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
    450                 455                 460

Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465                 470                 475                 480

Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
                485                 490                 495

Gly Pro Gly Thr Phe Gly Asp Met Lys Val Asn Ile His Ala Pro Leu
            500                 505                 510

Ser Gln Lys Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
        515                 520                 525

Gln Phe Val Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
    530                 535                 540

Pro Lys Thr Thr Asn Asn Leu Asn Thr Leu Gly Ser Glu Ser Tyr Arg
545                 550                 555                 560

Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
                565                 570                 575

Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Cys Val
            580                 585                 590

Asp Lys Ile Glu Phe Ile Pro Val Glu
        595                 600
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<210> 17

<211> 1803

<212> DNA

<213> Bacillus thuringiensis

<220>

<221> CDS

<222> (1)..(1803)

<223> TIC965

<400> 17

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atg aat tca acg gaa cat gat tat cta aaa gtt tgt aat gat tta agt       48
Met Asn Ser Thr Glu His Asp Tyr Leu Lys Val Cys Asn Asp Leu Ser
1               5                   10                  15

gac gcc aat att aat atg gaa cgg ttt gat aag aat gat gca ctg gaa       96
Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
            20                  25                  30

att ggt atg tcc att gta tct gaa ctt att ggt atg att cca ggc gga      144
Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
        35                  40                  45

aca gct ttg caa ttt gtg ttt aat caa ttg tgg tct cgt tta ggt gat      192
Thr Ala Leu Gln Phe Val Phe Asn Gln Leu Trp Ser Arg Leu Gly Asp
    50                  55                  60

tct gga tgg aat gcg ttc atg gaa cat gtg gag gaa tta att gat act      240
Ser Gly Trp Asn Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65                  70                  75                  80

aaa ata gaa ggg tat gca aaa aat aaa gcc tta tct gaa tta gca ggt      288
Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
                85                  90                  95

ata caa agg aac ctt gaa aca tat ata caa tta cgt aat gaa tgg gaa      336
Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
            100                 105                 110

aat gat att gaa aac tca aag gct caa ggt aag gta gct aat tac tat      384
Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
        115                 120                 125

gaa agt ctt gag cag gcg gtt gaa agg agt atg cct caa ttt gca gtg      432
Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
    130                 135                 140

gag aat ttt gaa gta cca ctt tta act gtc tat gtg caa gct gct aat      480
Glu Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145                 150                 155                 160

ctt cat tta tta tta tta aga gat gtt tca gtt tat gga aag tgt tgg      528
Leu His Leu Leu Leu Leu Arg Asp Val Ser Val Tyr Gly Lys Cys Trp
                165                 170                 175

gga tgg tcg gag cag aaa att aaa att tat tat gat aaa cag att aag      576
Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Lys Gln Ile Lys
            180                 185                 190
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tat acc cat gaa tac aca aat cat tgt gta aat tgg tat aat aaa gga      624
Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
        195                 200                 205

ctt gag aga tta aaa aat aaa ggt tct tct tat caa gat tgg tac aat      672
Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
    210                 215                 220

tat aat cgt ttc cgt aga gaa atg act ctt act gtt tta gat atc gtt      720
Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225                 230                 235                 240

gct tta ttc ccg cac tat gat gta caa act tat cca ata aca acc gtt      768
Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
                245                 250                 255

gct cag cta aca agg gaa gtt tat acg gat cct tta ctt aat ttt aat      816
Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
            260                 265                 270

cct aaa tta cat tct gtg tct caa tta cct agt ttt agt gac atg gaa      864
Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
        275                 280                 285

aat gca aca att aga act cca cat ctg atg gaa ttt tta aga atg cta      912
Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
    290                 295                 300

aca att tat aca gat tgg tat agt gtg gga aga aac tat tat tgg gga      960
Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305                 310                 315                 320

gga cat cgc gtg acg tct tac cat gta gga gga gag aat ata aga tca     1008
Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
                325                 330                 335

cct cta tat ggt aga gag gca aat caa gag gtt cct aga gat ttt tat     1056
Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
            340                 345                 350

ttt tat gga ccc gtt ttt aag acg tta tca aag ccg act cta aga cca     1104
Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
        355                 360                 365

tta cag cag cct gca cca gct cct cct ttt aat tta cgt agc tta gag     1152
Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
    370                 375                 380

gga gta gaa ttc cac act cct aca ggt agt ttt atg tat cgt gaa aga     1200
Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Met Tyr Arg Glu Arg
385                 390                 395                 400

gga tcg gta gat tct ttt aat gag ttg ccg cct ttt aat cca gtt ggg     1248
Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
                405                 410                 415

tta cct cat aag gta tac agt cac cgt tta tgt cat gca acg ttt gtt     1296
Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
            420                 425                 430

cgt aaa tct ggg acc cct tat tta aca aca ggt gcc atc ttt tct tgg     1344
Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp
        435                 440                 445

aca cat cgt agt gct gaa gaa acc aat aca att gaa tca aat att att     1392
Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
    450                 455                 460
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acg caa atc ccg tta gta aaa gca tat caa att ggg tca ggc act act     1440
Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465                 470                 475                 480

gta agg aaa gga cca gga ttc aca gga ggg gat ata ctt cga aga aca     1488
Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
                485                 490                 495

ggt cct gga aca ttt gga gat atg aga ata aat att aat gca cca tta     1536
Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
            500                 505                 510

tct caa aga tat cgt gta agg att cgt tat gct tct acg aca gat tta     1584
Ser Gln Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
        515                 520                 525

caa ttt gtc acg agt att aat ggg acc acc att aat att ggt aac ttc     1632
Gln Phe Val Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
    530                 535                 540

ccg aaa act att aat aat cta aat act tta ggt tct gag ggc tat aga     1680
Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser Glu Gly Tyr Arg
545                 550                 555                 560

aca gta tcg ttt agt act cca ttt agt ttc tca aat gca caa agc ata     1728
Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
                565                 570                 575

ttt aga tta ggt ata caa gca ttt tct gga gtt caa gaa gtt tat gtg     1776
Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val
            580                 585                 590

gat aaa att gaa ttt att cct gtt gaa                                1803
Asp Lys Ile Glu Phe Ile Pro Val Glu
        595                 600
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<210> 18

<211> 601

<212> PRT

<213> Bacillus thuringiensis

<400> 18

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Met Asn Ser Thr Glu His Asp Tyr Leu Lys Val Cys Asn Asp Leu Ser
1               5                   10                  15

Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
            20                  25                  30

Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
        35                  40                  45

Thr Ala Leu Gln Phe Val Phe Asn Gln Leu Trp Ser Arg Leu Gly Asp
    50                  55                  60

Ser Gly Trp Asn Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65                  70                  75                  80
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Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
85 90 95

Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
100 105 110

Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
115 120 125

Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
130 135 140

Glu Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145 150 155 160

Leu His Leu Leu Leu Leu Arg Asp Val Ser Val Tyr Gly Lys Cys Trp
165 170 175

Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Lys Gln Ile Lys
180 185 190

Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
195 200 205

Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
210 215 220

Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225 230 235 240

Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
245 250 255

Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
260 265 270

Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
275 280 285

Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
290 295 300

Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305 310 315 320

Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
325 330 335

Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
340 345 350

Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro

355 360 365

Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
370 375 380

Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Met Tyr Arg Glu Arg
385 390 395 400

Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
405 410 415

Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
420 425 430

Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp
435 440 445

Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
450 455 460

Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465 470 475 480

Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
485 490 495

Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
500 505 510

Ser Gln Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
515 520 525

Gln Phe Val Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
530 535 540

Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser Glu Gly Tyr Arg
545 550 555 560

Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
565 570 575

Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val
580 585 590

Asp Lys Ile Glu Phe Ile Pro Val Glu
595 600

<210> 19

<211> 1803

<212> DNA

<213> Bacillus thuringiensis

<220>

<221> CDS

<222> (1)..(1803)

<223> TIC966

<400> 19

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atg aat tca aag gaa cat gat tat cta aaa gtt tgt aat gat tta agt       48
Met Asn Ser Lys Glu His Asp Tyr Leu Lys Val Cys Asn Asp Leu Ser
1               5                  10                  15

gac gcc aat att aat atg gag cgg ttt gat aag aat gat gca ctg gaa       96
Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
            20                  25                  30

att ggt atg tcc att gta tct gaa ctt att ggt atg att cca ggc gga      144
Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
        35                  40                  45

aca gct ttg caa ttt gtg ttt aat caa ttg tgg tct cgt tta ggt gat      192
Thr Ala Leu Gln Phe Val Phe Asn Gln Leu Trp Ser Arg Leu Gly Asp
    50                  55                  60

tct gga tgg aat gcg ttc atg gaa cat gtg gag gaa tta att gat act      240
Ser Gly Trp Asn Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65                  70                  75                  80

aaa ata gaa ggg tat gca aaa aat aaa gcc tta tct gaa tta gca ggt      288
Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
                85                  90                  95

ata caa aga aac ctt gaa aca tat ata caa tta cgt aat gaa tgg gaa      336
Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
            100                 105                 110

aat gat att gaa aac tca aag gct caa ggt aag gta gct aat tac tat      384
Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
        115                 120                 125

gaa agt ctt gag cag gcg gtt gaa agg agt atg cct caa ttt gca gtg      432
Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
    130                 135                 140

ggg aat ttt gaa gta cca ctt tta act gtc tat gtg caa gct gct aat      480
Gly Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145                 150                 155                 160

ctt cat tta tta tta tta aga gat gtt tca gtt tat gga aag cgt tgg      528
Leu His Leu Leu Leu Leu Arg Asp Val Ser Val Tyr Gly Lys Arg Trp
                165                 170                 175

gga tgg tcg gag cag aaa att aaa att tat tat gat aaa cag att aag      576
Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Lys Gln Ile Lys
            180                 185                 190

tat acc cat gaa tac aca aat cat tgt gta aat tgg tat aat aaa gga      624
Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
        195                 200                 205

ctt gag aga tta aaa aat aaa ggt tct tct tat caa gat tgg tac aat      672
Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
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    210                 215                 220

tat aat cgt ttc cgt aga gaa atg act ctt act gtt tta gat atc gtt      720
Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225                 230                 235                 240

gct tta ttc ccg cac tat gat gta caa act tat cca ata aca acc gtt      768
Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
                245                 250                 255

gct cag cta aca agg gaa gtt tat acg gat cct tta ctt aat ttt aat      816
Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
            260                 265                 270

cct aaa tta cat tct gtg tct caa tta cct agt ttt agt gac atg gaa      864
Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
        275                 280                 285

aat gca aca att aga act cca cat ctg atg gaa ttt tta aga atg cta      912
Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
    290                 295                 300

aca att tat aca gat tgg tat agt gtg gga aga aac tat tat tgg gga      960
Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305                 310                 315                 320

gga cat cgc gtg acg tct tac cat gta gga gga gag aat ata aga tca     1008
Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
                325                 330                 335

cct cta tat ggt aga gag gca aat caa gag gtt cct aga gat ttt tat     1056
Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
            340                 345                 350

ttt tat gga ccc gtt ttt aag acg tta tca aag ccg act cta aga cca     1104
Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
        355                 360                 365

tta cag cag cct gca cca gct cct cct ttt aat tta cgt agc tta gag     1152
Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
    370                 375                 380

gga gta gaa ttc cac act cct aca ggt agt ttt atg tat cgt gaa aga     1200
Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Met Tyr Arg Glu Arg
385                 390                 395                 400

gga tcg gta gat tct ttt aat gag tta ccg cct ttt aat cca gtt ggg     1248
Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
                405                 410                 415

tta cct cat aag gta tac agt cac cgt tta tgt cat gca acg ttt gtt     1296
Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
            420                 425                 430

cgt aaa tct ggg acc cct tat tta aca aca ggt gcc atc ttt tct tgg     1344
Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp
        435                 440                 445

aca cat cgt agt gct gaa gaa acc aat aca att gaa tca aat att att     1392
Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
    450                 455                 460

acg caa atc ccg tta gta aaa gca tat caa att ggg tca ggc act act     1440
Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465                 470                 475                 480

gta agg aaa gga cca gga ctc aca gga ggg gat ata ctt cga aga aca     1488
Val Arg Lys Gly Pro Gly Leu Thr Gly Gly Asp Ile Leu Arg Arg Thr
                485                 490                 495
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ggt cct gga aca ttt gga gat atg aga ata aat att aat gca cca tta     1536
Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
            500                 505                 510

tct caa aga tat cgt gta agg att cgt tat gct tct acg aca gat tta     1584
Ser Gln Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
        515                 520                 525

caa ttt gtc acg agt att aat ggg acc acc att aat att ggt aac ttc     1632
Gln Phe Val Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
    530                 535                 540

cca aaa act att aat aat cta aat act tta ggt tct gag ggc tat aga     1680
Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser Glu Gly Tyr Arg
545                 550                 555                 560

aca gta tcg ttt agt act cca ttt agt ttc tca aat gca caa agc ata     1728
Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
                565                 570                 575

ttt aga tta ggt ata caa gca ttt tct gga gtt caa gaa gtt tat gtg     1776
Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val
            580                 585                 590

gat aaa att gaa ttt att cct gtt gaa                                1803
Asp Lys Ile Glu Phe Ile Pro Val Glu
        595                 600
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<210> 20

<211> 601

<212> PRT

<213> Bacillus thuringiensis

<400> 20

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Met Asn Ser Lys Glu His Asp Tyr Leu Lys Val Cys Asn Asp Leu Ser
1               5                   10                  15

Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
            20                  25                  30

Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
        35                  40                  45

Thr Ala Leu Gln Phe Val Phe Asn Gln Leu Trp Ser Arg Leu Gly Asp
    50                  55                  60

Ser Gly Trp Asn Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65                  70                  75                  80

Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
                85                  90                  95

Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
            100                 105                 110
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Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
115 120 125

Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
130 135 140

Gly Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145 150 155 160

Leu His Leu Leu Leu Leu Arg Asp Val Ser Val Tyr Gly Lys Arg Trp
165 170 175

Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Lys Gln Ile Lys
180 185 190

Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
195 200 205

Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
210 215 220

Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225 230 235 240

Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
245 250 255

Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
260 265 270

Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
275 280 285

Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
290 295 300

Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305 310 315 320

Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
325 330 335

Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
340 345 350

Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
355 360 365

Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
370 375 380

Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Met Tyr Arg Glu Arg
385 390 395 400

Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
405 410 415

Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
420 425 430

Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp
435 440 445

Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
450 455 460

Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465 470 475 480

Val Arg Lys Gly Pro Gly Leu Thr Gly Gly Asp Ile Leu Arg Arg Thr
485 490 495

Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
500 505 510

Ser Gln Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
515 520 525

Gln Phe Val Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
530 535 540

Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser Glu Gly Tyr Arg
545 550 555 560

Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
565 570 575

Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val
580 585 590

Asp Lys Ile Glu Phe Ile Pro Val Glu
595 600

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<211> 39

<212> DNA

<213> Artificial Sequence

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<223> tic900 5' thermal amplification primer

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<221> misc_feature

<222> (1)..(39)

<223> tic900 5' thermal amplification primer

<400> 21
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<210> 22

<211> 41

<212> DNA

<213> Artificial Sequence

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<223> tic900 3' thermal amplification primer

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<221> misc_feature

<222> (1)..(41)

<223> tic900 3' thermal amplification primer

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<210> 23

<211> 3504

<212> DNA

<213> Artificial Sequence

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<223> tic109 CDS consisting of CDS for TIC900 linked in frame to CDS fo
r Cry1Ac protoxin

<220>

<221> CDS

<222> (1)..(3504)

<223> 1-1803 TIC900 toxin domains I-III; 1804-1809 XhoI linker; 1810-35
04 Cry1Ac protoxin domain

<400> 23

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atg aat tca aag gaa cat gat tat cta aaa gtt tgt aat gat tta agt        48
Met Asn Ser Lys Glu His Asp Tyr Leu Lys Val Cys Asn Asp Leu Ser
1               5                   10                  15

gac gcc aat att aat atg gag cgg ttt gat aag aat gat gca ctg gaa        96
Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
            20                  25                  30

att ggt atg tcc att gta tct gaa ctt att ggt atg att cca ggc gga       144
Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
        35                  40                  45

aca gct ttg caa ttt gtg ttt aat caa ttg tgg tct cgt tta ggt gat       192
Thr Ala Leu Gln Phe Val Phe Asn Gln Leu Trp Ser Arg Leu Gly Asp
    50                  55                  60

tct gga tgg aat gcg ttc atg gaa cat gtg gag gaa tta att gat act       240
Ser Gly Trp Asn Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65                  70                  75                  80

aaa ata gaa ggg tat gca aaa aat aaa gcc tta tct gaa tta gca ggt       288
Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
                85                  90                  95

ata caa aga aac ctt gaa aca tat ata caa tta cgt aat gaa tgg gaa       336
Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
            100                 105                 110

aat gat att gaa aac tca aag gct caa ggt aag gta gct aat tac tat       384
Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
        115                 120                 125

gaa agt ctt gag cag gcg gtt gaa agg agt atg cct caa ttt gca gtg       432
Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
    130                 135                 140

ggg aat ttt gaa gta cca ctt tta act gtt tat gtg caa gct gct aat       480
Gly Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145                 150                 155                 160

ctt cat tta tta tta tta aga gat gtt tca gtt tat gga aag cgt tgg       528
Leu His Leu Leu Leu Leu Arg Asp Val Ser Val Tyr Gly Lys Arg Trp
                165                 170                 175

gga tgg tcg gag cag aaa att aaa att tat tat gat aga cag att aag       576
Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Arg Gln Ile Lys
            180                 185                 190

tat acc cat gaa tac aca aat cat tgt gta aat tgg tat aat aaa gga       624
Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
        195                 200                 205

ctt gag aga tta aaa aat aaa ggt tct tct tat caa gat tgg tac aat       672
Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
    210                 215                 220

tat aat cgt ttc cgt aga gaa atg act ctt act gtt tta gat atc gtt       720
Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225                 230                 235                 240

gct tta ttc ccg cac tat gat gta caa act tat cca ata aca acc gtt       768
Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
                245                 250                 255

gct cag tta aca agg gaa gtt tat acg gat cct tta ctt aat ttt aat       816
Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
            260                 265                 270
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cct aaa tta cat tct gtg tct caa tta cct agt ttt agt gac atg gaa      864
Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
        275                 280                 285

aat gca aca att aga act cca cat ctg atg gaa ttt tta aga atg cta      912
Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
    290                 295                 300

aca att tat aca gat tgg tat agt gtg gga aga aac tat tat tgg gga      960
Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305                 310                 315                 320

gga cat cgc gtg acg tct tac cat gta gga gga gag aat ata aga tca     1008
Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
                325                 330                 335

cct cta tat ggt aga gag gca aat caa gag gtt cct aga gat ttt tat     1056
Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
            340                 345                 350

ttt tat gga ccc gtt ttt aag acg tta tca aag ccg act cta aga cca     1104
Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
        355                 360                 365

tta cag cag cct gca cca gct cct cct ttt aat tta cgt agc tta gag     1152
Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
    370                 375                 380

gga gta gaa ttc cac act tct aca ggt agt ttt atg tat cgt gaa aga     1200
Gly Val Glu Phe His Thr Ser Thr Gly Ser Phe Met Tyr Arg Glu Arg
385                 390                 395                 400

gga tcg gta gat tct ttt aat gag tta ccg cct ttt aat cca gtt ggg     1248
Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
                405                 410                 415

tta cct cat aag gta tac agt cac cgt tta tgt cat gca acg ttt gtt     1296
Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
            420                 425                 430

cgt aaa tct ggg acc cct tat tta aca aca ggt gcc atc ttt tct tgg     1344
Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp
        435                 440                 445

aca cat cgt agt gct gaa gaa acc aat aca att gaa tca aat att att     1392
Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
    450                 455                 460

acg caa atc ccg tta gta aaa gca tat caa att gga tca ggc act act     1440
Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465                 470                 475                 480

gta agg aaa gga cca gga ttc aca gga ggg gat ata ctt cga aga aca     1488
Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
                485                 490                 495

ggt cct gga aca ttt gga gat atg aga ata aat att aat gca cca tta     1536
Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
            500                 505                 510

tct gaa aga tat cgt gta agg att cgt tat gct tct acg aca gat tta     1584
Ser Glu Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
        515                 520                 525

caa ttt gtc acg agt att aat ggg gcc acc att aat att ggt aac ttc     1632
Gln Phe Val Thr Ser Ile Asn Gly Ala Thr Ile Asn Ile Gly Asn Phe
    530                 535                 540

cca aaa act att aat aat cta aat act tta ggt tct gag ggc tat aga     1680
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Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser Glu Gly Tyr Arg
545                 550                 555                 560

aca gta tcg ttt agt act cca ttt agt ttc tca aat gca caa agc ata     1728
Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
                565                 570                 575

ttt aga tta ggt ata caa gca ttt tct gga gtt caa gaa gtt tat gtg     1776
Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val
            580                 585                 590

gat aaa att gaa ttt att cct gtt gaa ctc gag gct gaa tat aat ctg     1824
Asp Lys Ile Glu Phe Ile Pro Val Glu Leu Glu Ala Glu Tyr Asn Leu
        595                 600                 605

gaa aga gcg cag aag gcg gtg aat gcg ctg ttt acg tct aca aac caa     1872
Glu Arg Ala Gln Lys Ala Val Asn Ala Leu Phe Thr Ser Thr Asn Gln
    610                 615                 620

cta ggg cta aaa aca aat gta acg gat tat cat att gat caa gtg tcc     1920
Leu Gly Leu Lys Thr Asn Val Thr Asp Tyr His Ile Asp Gln Val Ser
625                 630                 635                 640

aat tta gtt acg tat tta tcg gat gaa ttt tgt ctg gat gaa aag cga     1968
Asn Leu Val Thr Tyr Leu Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg
                645                 650                 655

gaa ttg tcc gag aaa gtc aaa cat gcg aag cga ctc agt gat gaa cgc     2016
Glu Leu Ser Glu Lys Val Lys His Ala Lys Arg Leu Ser Asp Glu Arg
            660                 665                 670

aat tta ctc caa gat tca aat ttc aaa gac att aat agg caa cca gaa     2064
Asn Leu Leu Gln Asp Ser Asn Phe Lys Asp Ile Asn Arg Gln Pro Glu
        675                 680                 685

cgt ggg tgg ggc gga agt aca ggg att acc atc caa gga ggg gat gac     2112
Arg Gly Trp Gly Gly Ser Thr Gly Ile Thr Ile Gln Gly Gly Asp Asp
    690                 695                 700

gta ttt aaa gaa aat tac gtc aca cta tca ggt acc ttt gat gag tgc     2160
Val Phe Lys Glu Asn Tyr Val Thr Leu Ser Gly Thr Phe Asp Glu Cys
705                 710                 715                 720

tat cca aca tat ttg tat caa aaa atc gat gaa tca aaa tta aaa gcc     2208
Tyr Pro Thr Tyr Leu Tyr Gln Lys Ile Asp Glu Ser Lys Leu Lys Ala
                725                 730                 735

ttt acc cgt tat caa tta aga ggg tat atc gaa gat agt caa gac tta     2256
Phe Thr Arg Tyr Gln Leu Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu
            740                 745                 750

gaa atc tat tta att cgc tac aat gca aaa cat gaa aca gta aat gtg     2304
Glu Ile Tyr Leu Ile Arg Tyr Asn Ala Lys His Glu Thr Val Asn Val
        755                 760                 765

cca ggt acg ggt tcc tta tgg ccg ctt tca gcc caa agt cca atc gga     2352
Pro Gly Thr Gly Ser Leu Trp Pro Leu Ser Ala Gln Ser Pro Ile Gly
    770                 775                 780

aag tgt gga gag ccg aat cga tgc gcg cca cac ctt gaa tgg aat cct     2400
Lys Cys Gly Glu Pro Asn Arg Cys Ala Pro His Leu Glu Trp Asn Pro
785                 790                 795                 800

gac tta gat tgt tcg tgt agg gat gga gaa aag tgt gcc cat cat tcg     2448
Asp Leu Asp Cys Ser Cys Arg Asp Gly Glu Lys Cys Ala His His Ser
                805                 810                 815

cat cat ttc tcc tta gac att gat gta gga tgt aca gac tta aat gag     2496
His His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu
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          820                 825                 830

gac cta ggt gta tgg gtg atc ttt aag att aag acg caa gat ggg cac     2544
Asp Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His
        835                 840                 845

gca aga cta ggg aat cta gag ttt ctc gaa gag aaa cca tta gta gga     2592
Ala Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Val Gly
    850                 855                 860

gaa gcg cta gct cgt gtg aaa aga gcg gag aaa aaa tgg aga gac aaa     2640
Glu Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys
865                 870                 875                 880

cgt gaa aaa ttg gaa tgg gaa aca aat atc gtt tat aaa gag gca aaa     2688
Arg Glu Lys Leu Glu Trp Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys
                885                 890                 895

gaa tct gta gat gct tta ttt gta aac tct caa tat gat caa tta caa     2736
Glu Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Gln Leu Gln
            900                 905                 910

gcg gat acg aat att gcc atg att cat gcg gca gat aaa cgt gtt cat     2784
Ala Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val His
        915                 920                 925

agc att cga gaa gct tat ctg cct gag ctg tct gtg att ccg ggt gtc     2832
Ser Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly Val
    930                 935                 940

aat gcg gct att ttt gaa gaa tta gaa ggg cgt att ttc act gca ttc     2880
Asn Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr Ala Phe
945                 950                 955                 960

tcc cta tat gat gcg aga aat gtc att aaa aat ggt gat ttt aat aat     2928
Ser Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe Asn Asn
                965                 970                 975

ggc tta tcc tgc tgg aac gtg aaa ggg cat gta gat gta gaa gaa caa     2976
Gly Leu Ser Cys Trp Asn Val Lys Gly His Val Asp Val Glu Glu Gln
            980                 985                 990

aac aac caa cgt tcg gtc ctt gtt  gtt ccg gaa tgg gaa  gca gaa gtg   3024
Asn Asn Gln Arg Ser Val Leu Val  Val Pro Glu Trp Glu  Ala Glu Val
        995                 1000                1005

tca caa  gaa gtt cgt gtc tgt  ccg ggt cgt ggc tat  atc ctt cgt      3069
Ser Gln  Glu Val Arg Val Cys  Pro Gly Arg Gly Tyr  Ile Leu Arg
    1010                1015                1020

gtc aca  gcg tac aag gag gga  tat gga gaa ggt tgc  gta acc att      3114
Val Thr  Ala Tyr Lys Glu Gly  Tyr Gly Glu Gly Cys  Val Thr Ile
    1025                1030                1035

cat gag  atc gag aac aat aca  gac gaa ctg aag ttt  agc aac tgc      3159
His Glu  Ile Glu Asn Asn Thr  Asp Glu Leu Lys Phe  Ser Asn Cys
    1040                1045                1050

gta gaa  gag gaa atc tat cca  aat aac acg gta acg  tgt aat gat      3204
Val Glu  Glu Glu Ile Tyr Pro  Asn Asn Thr Val Thr  Cys Asn Asp
    1055                1060                1065

tat act  gta aat caa gaa gaa  tac gga ggt gcg tac  act tct cgt      3249
Tyr Thr  Val Asn Gln Glu Glu  Tyr Gly Gly Ala Tyr  Thr Ser Arg
    1070                1075                1080

aat cga  gga tat aac gaa gct  cct tcc gta cca gct  gat tat gcg      3294
Asn Arg  Gly Tyr Asn Glu Ala  Pro Ser Val Pro Ala  Asp Tyr Ala
    1085                1090                1095
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tca gtc  tat gaa gaa aaa tcg  tat aca gat gga cga  aga gag aat      3339
Ser Val  Tyr Glu Glu Lys Ser  Tyr Thr Asp Gly Arg  Arg Glu Asn
    1100                 1105                 1110

cct tgt  gaa ttt aac aga ggg  tat agg gat tac acg  cca cta cca      3384
Pro Cys  Glu Phe Asn Arg Gly  Tyr Arg Asp Tyr Thr  Pro Leu Pro
    1115                 1120                 1125

gtt ggt  tat gtg aca aaa gaa  tta gaa tac ttc cca  gaa acc gat      3429
Val Gly  Tyr Val Thr Lys Glu  Leu Glu Tyr Phe Pro  Glu Thr Asp
    1130                 1135                 1140

aag gta  tgg att gag att gga  gaa acg gaa gga aca  ttt atc gtg      3474
Lys Val  Trp Ile Glu Ile Gly  Glu Thr Glu Gly Thr  Phe Ile Val
    1145                 1150                 1155

gac agc  gtg gaa tta ctc ctt  atg gag gaa                         3504
Asp Ser  Val Glu Leu Leu Leu  Met Glu Glu
    1160                 1165
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<210> 24

<211> 1168

<212> PRT

<213> Artificial Sequence

<220>

<223> tic109 CDS consisting of CDS for TIC900 linked in frame to CDS fo
r Cry1Ac protoxin

<400> 24

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Met Asn Ser Lys Glu His Asp Tyr Leu Lys Val Cys Asn Asp Leu Ser
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Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
            20                  25                  30

Ile Gly Met Ser Ile Val Ser Glu Leu Ile Gly Met Ile Pro Gly Gly
        35                  40                  45

Thr Ala Leu Gln Phe Val Phe Asn Gln Leu Trp Ser Arg Leu Gly Asp
    50                  55                  60

Ser Gly Trp Asn Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65                  70                  75                  80

Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
                85                  90                  95

Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
            100                 105                 110

Asn Asp Ile Glu Asn Ser Lys Ala Gln Gly Lys Val Ala Asn Tyr Tyr
        115                 120                 125
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Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
    130                 135                 140

Gly Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145                 150                 155                 160

Leu His Leu Leu Leu Leu Arg Asp Val Ser Val Tyr Gly Lys Arg Trp
                165                 170                 175

Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Arg Gln Ile Lys
            180                 185                 190

Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
        195                 200                 205

Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
    210                 215                 220

Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225                 230                 235                 240

Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
                245                 250                 255

Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
            260                 265                 270

Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
        275                 280                 285

Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
    290                 295                 300

Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305                 310                 315                 320

Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
                325                 330                 335

Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
            340                 345                 350

Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
        355                 360                 365

Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
    370                 375                 380

Gly Val Glu Phe His Thr Ser Thr Gly Ser Phe Met Tyr Arg Glu Arg
385                 390                 395                 400
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Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro Val Gly
405 410 415

Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
420 425 430

Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp
435 440 445

Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
450 455 460

Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465 470 475 480

Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
485 490 495

Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
500 505 510

Ser Glu Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
515 520 525

Gln Phe Val Thr Ser Ile Asn Gly Ala Thr Ile Asn Ile Gly Asn Phe
530 535 540

Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser Glu Gly Tyr Arg
545 550 555 560

Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln Ser Ile
565 570 575

Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val
580 585 590

Asp Lys Ile Glu Phe Ile Pro Val Glu Leu Glu Ala Glu Tyr Asn Leu
595 600 605

Glu Arg Ala Gln Lys Ala Val Asn Ala Leu Phe Thr Ser Thr Asn Gln
610 615 620

Leu Gly Leu Lys Thr Asn Val Thr Asp Tyr His Ile Asp Gln Val Ser
625 630 635 640

Asn Leu Val Thr Tyr Leu Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg
645 650 655

Glu Leu Ser Glu Lys Val Lys His Ala Lys Arg Leu Ser Asp Glu Arg
660 665 670

Asn Leu Leu Gln Asp Ser Asn Phe Lys Asp Ile Asn Arg Gln Pro Glu
675 680 685

Arg Gly Trp Gly Gly Ser Thr Gly Ile Thr Ile Gln Gly Gly Asp Asp
690 695 700

Val Phe Lys Glu Asn Tyr Val Thr Leu Ser Gly Thr Phe Asp Glu Cys
705 710 715 720

Tyr Pro Thr Tyr Leu Tyr Gln Lys Ile Asp Glu Ser Lys Leu Lys Ala
725 730 735

Phe Thr Arg Tyr Gln Leu Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu
740 745 750

Glu Ile Tyr Leu Ile Arg Tyr Asn Ala Lys His Glu Thr Val Asn Val
755 760 765

Pro Gly Thr Gly Ser Leu Trp Pro Leu Ser Ala Gln Ser Pro Ile Gly
770 775 780

Lys Cys Gly Glu Pro Asn Arg Cys Ala Pro His Leu Glu Trp Asn Pro
785 790 795 800

Asp Leu Asp Cys Ser Cys Arg Asp Gly Glu Lys Cys Ala His His Ser
805 810 815

His His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu
820 825 830

Asp Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His
835 840 845

Ala Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Val Gly
850 855 860

Glu Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys
865 870 875 880

Arg Glu Lys Leu Glu Trp Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys
885 890 895

Glu Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Gln Leu Gln
900 905 910

Ala Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val His
915 920 925

Ser Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly Val
930 935 940

Asn Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr Ala Phe

945 950 955 960

Ser Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe Asn Asn
965 970 975

Gly Leu Ser Cys Trp Asn Val Lys Gly His Val Asp Val Glu Glu Gln
980 985 990

Asn Asn Gln Arg Ser Val Leu Val Val Pro Glu Trp Glu Ala Glu Val
995 1000 1005

Ser Gln Glu Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg
1010 1015 1020

Val Thr Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile
1025 1030 1035

His Glu Ile Glu Asn Asn Thr Asp Glu Leu Lys Phe Ser Asn Cys
1040 1045 1050

Val Glu Glu Glu Ile Tyr Pro Asn Asn Thr Val Thr Cys Asn Asp
1055 1060 1065

Tyr Thr Val Asn Gln Glu Glu Tyr Gly Gly Ala Tyr Thr Ser Arg
1070 1075 1080

Asn Arg Gly Tyr Asn Glu Ala Pro Ser Val Pro Ala Asp Tyr Ala
1085 1090 1095

Ser Val Tyr Glu Glu Lys Ser Tyr Thr Asp Gly Arg Arg Glu Asn
1100 1105 1110

Pro Cys Glu Phe Asn Arg Gly Tyr Arg Asp Tyr Thr Pro Leu Pro
1115 1120 1125

Val Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp
1130 1135 1140

Lys Val Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe Ile Val
1145 1150 1155

Asp Ser Val Glu Leu Leu Leu Met Glu Glu
1160 1165

<210> 25

<211> 3510

<212> DNA

<213> Artificial Sequence

<220>

<223> tic110 CDS consisting of CDS for Domain I of Cry1F linked in frame to CDS for Domain II-III of TIC900 linked in frame to CDS for Cry1Ac protoxin

<220>

<221> CDS

<222> (1)..(3510)

<223> Cry1F Domain I nt 1-723 (amino acid 1-233); TIC900 Domain II-III nt 724-1809 (amino acid 234-603); Cry1Ac protoxin domain nt 1810-3510 (amino acid 604-1170)

<400> 25

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atg gag aat aat att caa aat caa tgc gta cct tac aat tgt tta aat       48
Met Glu Asn Asn Ile Gln Asn Gln Cys Val Pro Tyr Asn Cys Leu Asn
1               5                  10                  15

aat cct gaa gta gaa ata tta aat gaa gaa aga agt act ggc aga tta       96
Asn Pro Glu Val Glu Ile Leu Asn Glu Glu Arg Ser Thr Gly Arg Leu
            20                  25                  30

ccg tta gat ata tcc tta tcg ctt aca cgt ttc ctt ttg agt gaa ttt      144
Pro Leu Asp Ile Ser Leu Ser Leu Thr Arg Phe Leu Leu Ser Glu Phe
        35                  40                  45

gtt cca ggt gtg gga gtt gcg ttt gga tta ttt gat tta ata tgg ggt      192
Val Pro Gly Val Gly Val Ala Phe Gly Leu Phe Asp Leu Ile Trp Gly
    50                  55                  60

ttt ata act cct tct gat tgg agc tta ttt ctt tta cag att gaa caa      240
Phe Ile Thr Pro Ser Asp Trp Ser Leu Phe Leu Leu Gln Ile Glu Gln
65                  70                  75                  80

ttg att gag caa aga ata gaa aca ttg gaa agg aac cgg gca att act      288
Leu Ile Glu Gln Arg Ile Glu Thr Leu Glu Arg Asn Arg Ala Ile Thr
                85                  90                  95

aca tta cga ggg tta gca gat agc tat gaa att tat att gaa gca cta      336
Thr Leu Arg Gly Leu Ala Asp Ser Tyr Glu Ile Tyr Ile Glu Ala Leu
            100                 105                 110

aga gag tgg gaa gca aat cct aat aat gca caa tta agg gaa gat gtg      384
Arg Glu Trp Glu Ala Asn Pro Asn Asn Ala Gln Leu Arg Glu Asp Val
        115                 120                 125

cgt att cga ttt gct aat aca gac gac gct tta ata aca gca ata aat      432
Arg Ile Arg Phe Ala Asn Thr Asp Asp Ala Leu Ile Thr Ala Ile Asn
    130                 135                 140

aat ttt aca ctt aca agt ttt gaa atc cct ctt tta tcg gtc tat gtt      480
Asn Phe Thr Leu Thr Ser Phe Glu Ile Pro Leu Leu Ser Val Tyr Val
145                 150                 155                 160

caa gcg gcg aat tta cat tta tca cta tta aga gac gct gta tcg ttt      528
Gln Ala Ala Asn Leu His Leu Ser Leu Leu Arg Asp Ala Val Ser Phe
                165                 170                 175

ggg cag ggt tgg gga ctg gat ata gct act gtt aat aat cat tat aat      576
Gly Gln Gly Trp Gly Leu Asp Ile Ala Thr Val Asn Asn His Tyr Asn
            180                 185                 190

aga tta ata aat ctt att cat aga tat acg aaa cat tgt ttg gac aca      624
Arg Leu Ile Asn Leu Ile His Arg Tyr Thr Lys His Cys Leu Asp Thr
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        195                 200                 205

tac aat caa gga tta gaa aac tta aga ggt act aat act cga caa tgg      672
Tyr Asn Gln Gly Leu Glu Asn Leu Arg Gly Thr Asn Thr Arg Gln Trp
    210                 215                 220

gca aga ttc aat cag ttt agg aga gat tta aca ctt act gta tta gat      720
Ala Arg Phe Asn Gln Phe Arg Arg Asp Leu Thr Leu Thr Val Leu Asp
225                 230                 235                 240

atc gtt gct tta ttc ccg cac tat gat gta caa act tat cca ata aca      768
Ile Val Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr
                245                 250                 255

acc gtt gct cag tta aca agg gaa gtt tat acg gat cct tta ctt aat      816
Thr Val Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn
            260                 265                 270

ttt aat cct aaa tta cat tct gtg tct caa tta cct agt ttt agt gac      864
Phe Asn Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp
        275                 280                 285

atg gaa aat gca aca att aga act cca cat ctg atg gaa ttt tta aga      912
Met Glu Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg
    290                 295                 300

atg cta aca att tat aca gat tgg tat agt gtg gga aga aac tat tat      960
Met Leu Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr
305                 310                 315                 320

tgg gga gga cat cgc gtg acg tct tac cat gta gga gga gag aat ata     1008
Trp Gly Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile
                325                 330                 335

aga tca cct cta tat ggt aga gag gca aat caa gag gtt cct aga gat     1056
Arg Ser Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp
            340                 345                 350

ttt tat ttt tat gga ccc gtt ttt aag acg tta tca aag ccg act cta     1104
Phe Tyr Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu
        355                 360                 365

aga cca tta cag cag cct gca cca gct cct cct ttt aat tta cgt agc     1152
Arg Pro Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser
    370                 375                 380

tta gag gga gta gaa ttc cac act tct aca ggt agt ttt atg tat cgt     1200
Leu Glu Gly Val Glu Phe His Thr Ser Thr Gly Ser Phe Met Tyr Arg
385                 390                 395                 400

gaa aga gga tcg gta gat tct ttt aat gag tta ccg cct ttt aat cca     1248
Glu Arg Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro
                405                 410                 415

gtt ggg tta cct cat aag gta tac agt cac cgt tta tgt cat gca acg     1296
Val Gly Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr
            420                 425                 430

ttt gtt cgt aaa tct ggg acc cct tat tta aca aca ggt gcc atc ttt     1344
Phe Val Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe
        435                 440                 445

tct tgg aca cat cgt agt gct gaa gaa acc aat aca att gaa tca aat     1392
Ser Trp Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn
    450                 455                 460

att att acg caa atc ccg tta gta aaa gca tat caa att gga tca ggc     1440
Ile Ile Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly
465                 470                 475                 480
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act act gta agg aaa gga cca gga ttc aca gga ggg gat ata ctt cga      1488
Thr Thr Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg
                485                 490                 495

aga aca ggt cct gga aca ttt gga gat atg aga ata aat att aat gca      1536
Arg Thr Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala
            500                 505                 510

cca tta tct gaa aga tat cgt gta agg att cgt tat gct tct acg aca      1584
Pro Leu Ser Glu Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr
        515                 520                 525

gat tta caa ttt gtc acg agt att aat ggg gcc acc att aat att ggt      1632
Asp Leu Gln Phe Val Thr Ser Ile Asn Gly Ala Thr Ile Asn Ile Gly
    530                 535                 540

aac ttc cca aaa act att aat aat cta aat act tta ggt tct gag ggc      1680
Asn Phe Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser Glu Gly
545                 550                 555                 560

tat aga aca gta tcg ttt agt act cca ttt agt ttc tca aat gca caa      1728
Tyr Arg Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln
                565                 570                 575

agc ata ttt aga tta ggt ata caa gca ttt tct gga gtt caa gaa gtt      1776
Ser Ile Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val
            580                 585                 590

tat gtg gat aaa att gaa ttt att cct gtt gaa ctc gag gct gaa tat      1824
Tyr Val Asp Lys Ile Glu Phe Ile Pro Val Glu Leu Glu Ala Glu Tyr
        595                 600                 605

aat ctg gaa aga gcg cag aag gcg gtg aat gcg ctg ttt acg tct aca      1872
Asn Leu Glu Arg Ala Gln Lys Ala Val Asn Ala Leu Phe Thr Ser Thr
    610                 615                 620

aac caa cta ggg cta aaa aca aat gta acg gat tat cat att gat caa      1920
Asn Gln Leu Gly Leu Lys Thr Asn Val Thr Asp Tyr His Ile Asp Gln
625                 630                 635                 640

gtg tcc aat tta gtt acg tat tta tcg gat gaa ttt tgt ctg gat gaa      1968
Val Ser Asn Leu Val Thr Tyr Leu Ser Asp Glu Phe Cys Leu Asp Glu
                645                 650                 655

aag cga gaa ttg tcc gag aaa gtc aaa cat gcg aag cga ctc agt gat      2016
Lys Arg Glu Leu Ser Glu Lys Val Lys His Ala Lys Arg Leu Ser Asp
            660                 665                 670

gaa cgc aat tta ctc caa gat tca aat ttc aaa gac att aat agg caa      2064
Glu Arg Asn Leu Leu Gln Asp Ser Asn Phe Lys Asp Ile Asn Arg Gln
        675                 680                 685

cca gaa cgt ggg tgg ggc gga agt aca ggg att acc atc caa gga ggg      2112
Pro Glu Arg Gly Trp Gly Gly Ser Thr Gly Ile Thr Ile Gln Gly Gly
    690                 695                 700

gat gac gta ttt aaa gaa aat tac gtc aca cta tca ggt acc ttt gat      2160
Asp Asp Val Phe Lys Glu Asn Tyr Val Thr Leu Ser Gly Thr Phe Asp
705                 710                 715                 720

gag tgc tat cca aca tat ttg tat caa aaa atc gat gaa tca aaa tta      2208
Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln Lys Ile Asp Glu Ser Lys Leu
                725                 730                 735

aaa gcc ttt acc cgt tat caa tta aga ggg tat atc gaa gat agt caa      2256
Lys Ala Phe Thr Arg Tyr Gln Leu Arg Gly Tyr Ile Glu Asp Ser Gln
            740                 745                 750
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gac tta gaa atc tat tta att cgc tac aat gca aaa cat gaa aca gta      2304
Asp Leu Glu Ile Tyr Leu Ile Arg Tyr Asn Ala Lys His Glu Thr Val
        755                 760                 765

aat gtg cca ggt acg ggt tcc tta tgg ccg ctt tca gcc caa agt cca      2352
Asn Val Pro Gly Thr Gly Ser Leu Trp Pro Leu Ser Ala Gln Ser Pro
    770                 775                 780

atc gga aag tgt gga gag ccg aat cga tgc gcg cca cac ctt gaa tgg      2400
Ile Gly Lys Cys Gly Glu Pro Asn Arg Cys Ala Pro His Leu Glu Trp
785                 790                 795                 800

aat cct gac tta gat tgt tcg tgt agg gat gga gaa aag tgt gcc cat      2448
Asn Pro Asp Leu Asp Cys Ser Cys Arg Asp Gly Glu Lys Cys Ala His
                805                 810                 815

cat tcg cat cat ttc tcc tta gac att gat gta gga tgt aca gac tta      2496
His Ser His His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu
            820                 825                 830

aat gag gac cta ggt gta tgg gtg atc ttt aag att aag acg caa gat      2544
Asn Glu Asp Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp
        835                 840                 845

ggg cac gca aga cta ggg aat cta gag ttt ctc gaa gag aaa cca tta      2592
Gly His Ala Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu
    850                 855                 860

gta gga gaa gcg cta gct cgt gtg aaa aga gcg gag aaa aaa tgg aga      2640
Val Gly Glu Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg
865                 870                 875                 880

gac aaa cgt gaa aaa ttg gaa tgg gaa aca aat atc gtt tat aaa gag      2688
Asp Lys Arg Glu Lys Leu Glu Trp Glu Thr Asn Ile Val Tyr Lys Glu
                885                 890                 895

gca aaa gaa tct gta gat gct tta ttt gta aac tct caa tat gat caa      2736
Ala Lys Glu Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Gln
            900                 905                 910

tta caa gcg gat acg aat att gcc atg att cat gcg gca gat aaa cgt      2784
Leu Gln Ala Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg
        915                 920                 925

gtt cat agc att cga gaa gct tat ctg cct gag ctg tct gtg att ccg      2832
Val His Ser Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro
    930                 935                 940

ggt gtc aat gcg gct att ttt gaa gaa tta gaa ggg cgt att ttc act      2880
Gly Val Asn Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr
945                 950                 955                 960

gca ttc tcc cta tat gat gcg aga aat gtc att aaa aat ggt gat ttt      2928
Ala Phe Ser Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe
                965                 970                 975

aat aat ggc tta tcc tgc tgg aac gtg aaa ggg cat gta gat gta gaa      2976
Asn Asn Gly Leu Ser Cys Trp Asn Val Lys Gly His Val Asp Val Glu
            980                 985                 990

gaa caa aac aac caa cgt tcg gtc  ctt gtt gtt ccg gaa  tgg gaa gca   3024
Glu Gln Asn Asn Gln Arg Ser Val  Leu Val Val Pro Glu  Trp Glu Ala
        995                 1000                1005

gaa gtg  tca caa gaa gtt cgt  gtc tgt ccg ggt cgt  ggc tat atc      3069
Glu Val  Ser Gln Glu Val Arg  Val Cys Pro Gly Arg  Gly Tyr Ile
    1010                1015                1020

ctt cgt  gtc aca gcg tac aag  gag gga tat gga gaa  ggt tgc gta      3114
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Leu Arg  Val Thr Ala Tyr Lys  Glu Gly Tyr Gly Glu  Gly Cys Val
    1025                1030                1035

acc att  cat gag atc gag aac  aat aca gac gaa ctg  aag ttt agc      3159
Thr Ile  His Glu Ile Glu Asn  Asn Thr Asp Glu Leu  Lys Phe Ser
    1040                1045                1050

aac tgc  gta gaa gag gaa atc  tat cca aat aac acg  gta acg tgt      3204
Asn Cys  Val Glu Glu Glu Ile  Tyr Pro Asn Asn Thr  Val Thr Cys
    1055                1060                1065

aat gat  tat act gta aat caa  gaa gaa tac gga ggt  gcg tac act      3249
Asn Asp  Tyr Thr Val Asn Gln  Glu Glu Tyr Gly Gly  Ala Tyr Thr
    1070                1075                1080

tct cgt  aat cga gga tat aac  gaa gct cct tcc gta  cca gct gat      3294
Ser Arg  Asn Arg Gly Tyr Asn  Glu Ala Pro Ser Val  Pro Ala Asp
    1085                1090                1095

tat gcg  tca gtc tat gaa gaa  aaa tcg tat aca gat  gga cga aga      3339
Tyr Ala  Ser Val Tyr Glu Glu  Lys Ser Tyr Thr Asp  Gly Arg Arg
    1100                1105                1110

gag aat  cct tgt gaa ttt aac  aga ggg tat agg gat  tac acg cca      3384
Glu Asn  Pro Cys Glu Phe Asn  Arg Gly Tyr Arg Asp  Tyr Thr Pro
    1115                1120                1125

cta cca  gtt ggt tat gtg aca  aaa gaa tta gaa tac  ttc cca gaa      3429
Leu Pro  Val Gly Tyr Val Thr  Lys Glu Leu Glu Tyr  Phe Pro Glu
    1130                1135                1140

acc gat  aag gta tgg att gag  att gga gaa acg gaa  gga aca ttt      3474
Thr Asp  Lys Val Trp Ile Glu  Ile Gly Glu Thr Glu  Gly Thr Phe
    1145                1150                1155

atc gtg  gac agc gtg gaa tta  ctc ctt atg gag gaa                  3510
Ile Val  Asp Ser Val Glu Leu  Leu Leu Met Glu Glu
    1160                1165                1170
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<210> 26

<211> 1170

<212> PRT

<213> Artificial Sequence

<220>

<223> tic110 CDS consisting of CDS for Domain I of Cry1F linked in frame to CDS for Domain II-III of TIC900 linked in frame to CDS for Cry1Ac protoxin

<400> 26

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Met Glu Asn Asn Ile Gln Asn Gln Cys Val Pro Tyr Asn Cys Leu Asn
1               5                  10                  15

Asn Pro Glu Val Glu Ile Leu Asn Glu Glu Arg Ser Thr Gly Arg Leu
            20                  25                  30

Pro Leu Asp Ile Ser Leu Ser Leu Thr Arg Phe Leu Leu Ser Glu Phe
        35                  40                  45
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Val Pro Gly Val Gly Val Ala Phe Gly Leu Phe Asp Leu Ile Trp Gly
     50                  55                  60

Phe Ile Thr Pro Ser Asp Trp Ser Leu Phe Leu Leu Gln Ile Glu Gln
65                  70                  75                  80

Leu Ile Glu Gln Arg Ile Glu Thr Leu Glu Arg Asn Arg Ala Ile Thr
                85                  90                  95

Thr Leu Arg Gly Leu Ala Asp Ser Tyr Glu Ile Tyr Ile Glu Ala Leu
            100                 105                 110

Arg Glu Trp Glu Ala Asn Pro Asn Asn Ala Gln Leu Arg Glu Asp Val
        115                 120                 125

Arg Ile Arg Phe Ala Asn Thr Asp Asp Ala Leu Ile Thr Ala Ile Asn
    130                 135                 140

Asn Phe Thr Leu Thr Ser Phe Glu Ile Pro Leu Leu Ser Val Tyr Val
145                 150                 155                 160

Gln Ala Ala Asn Leu His Leu Ser Leu Leu Arg Asp Ala Val Ser Phe
                165                 170                 175

Gly Gln Gly Trp Gly Leu Asp Ile Ala Thr Val Asn Asn His Tyr Asn
            180                 185                 190

Arg Leu Ile Asn Leu Ile His Arg Tyr Thr Lys His Cys Leu Asp Thr
        195                 200                 205

Tyr Asn Gln Gly Leu Glu Asn Leu Arg Gly Thr Asn Thr Arg Gln Trp
    210                 215                 220

Ala Arg Phe Asn Gln Phe Arg Arg Asp Leu Thr Leu Thr Val Leu Asp
225                 230                 235                 240

Ile Val Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr
                245                 250                 255

Thr Val Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn
            260                 265                 270

Phe Asn Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp
        275                 280                 285

Met Glu Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg
    290                 295                 300

Met Leu Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr
305                 310                 315                 320
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Trp Gly Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile
325 330 335

Arg Ser Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp
340 345 350

Phe Tyr Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu
355 360 365

Arg Pro Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser
370 375 380

Leu Glu Gly Val Glu Phe His Thr Ser Thr Gly Ser Phe Met Tyr Arg
385 390 395 400

Glu Arg Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Pro
405 410 415

Val Gly Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr
420 425 430

Phe Val Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe
435 440 445

Ser Trp Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn
450 455 460

Ile Ile Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly
465 470 475 480

Thr Thr Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg
485 490 495

Arg Thr Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala
500 505 510

Pro Leu Ser Glu Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr
515 520 525

Asp Leu Gln Phe Val Thr Ser Ile Asn Gly Ala Thr Ile Asn Ile Gly
530 535 540

Asn Phe Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser Glu Gly
545 550 555 560

Tyr Arg Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn Ala Gln
565 570 575

Ser Ile Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val
580 585 590

Tyr Val Asp Lys Ile Glu Phe Ile Pro Val Glu Leu Glu Ala Glu Tyr

595 600 605

Asn Leu Glu Arg Ala Gln Lys Ala Val Asn Ala Leu Phe Thr Ser Thr
610 615 620

Asn Gln Leu Gly Leu Lys Thr Asn Val Thr Asp Tyr His Ile Asp Gln
625 630 635 640

Val Ser Asn Leu Val Thr Tyr Leu Ser Asp Glu Phe Cys Leu Asp Glu
645 650 655

Lys Arg Glu Leu Ser Glu Lys Val Lys His Ala Lys Arg Leu Ser Asp
660 665 670

Glu Arg Asn Leu Leu Gln Asp Ser Asn Phe Lys Asp Ile Asn Arg Gln
675 680 685

Pro Glu Arg Gly Trp Gly Gly Ser Thr Gly Ile Thr Ile Gln Gly Gly
690 695 700

Asp Asp Val Phe Lys Glu Asn Tyr Val Thr Leu Ser Gly Thr Phe Asp
705 710 715 720

Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln Lys Ile Asp Glu Ser Lys Leu
725 730 735

Lys Ala Phe Thr Arg Tyr Gln Leu Arg Gly Tyr Ile Glu Asp Ser Gln
740 745 750

Asp Leu Glu Ile Tyr Leu Ile Arg Tyr Asn Ala Lys His Glu Thr Val
755 760 765

Asn Val Pro Gly Thr Gly Ser Leu Trp Pro Leu Ser Ala Gln Ser Pro
770 775 780

Ile Gly Lys Cys Gly Glu Pro Asn Arg Cys Ala Pro His Leu Glu Trp
785 790 795 800

Asn Pro Asp Leu Asp Cys Ser Cys Arg Asp Gly Glu Lys Cys Ala His
805 810 815

His Ser His His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu
820 825 830

Asn Glu Asp Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp
835 840 845

Gly His Ala Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu
850 855 860

Val Gly Glu Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg
865 870 875 880

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Asp Lys Arg Glu Lys Leu Glu Trp Glu Thr Asn Ile Val Tyr Lys Glu
                885                 890                 895

Ala Lys Glu Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Gln
            900                 905                 910

Leu Gln Ala Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg
        915                 920                 925

Val His Ser Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro
    930                 935                 940

Gly Val Asn Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr
945                 950                 955                 960

Ala Phe Ser Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe
                965                 970                 975

Asn Asn Gly Leu Ser Cys Trp Asn Val Lys Gly His Val Asp Val Glu
            980                 985                 990

Glu Gln Asn Asn Gln Arg Ser Val  Leu Val Val Pro Glu  Trp Glu Ala
        995                 1000                1005

Glu Val  Ser Gln Glu Val Arg  Val Cys Pro Gly Arg  Gly Tyr Ile
    1010                1015                1020

Leu Arg  Val Thr Ala Tyr Lys  Glu Gly Tyr Gly Glu  Gly Cys Val
    1025                1030                1035

Thr Ile  His Glu Ile Glu Asn  Asn Thr Asp Glu Leu  Lys Phe Ser
    1040                1045                1050

Asn Cys  Val Glu Glu Glu Ile  Tyr Pro Asn Asn Thr  Val Thr Cys
    1055                1060                1065

Asn Asp  Tyr Thr Val Asn Gln  Glu Glu Tyr Gly Gly  Ala Tyr Thr
    1070                1075                1080

Ser Arg  Asn Arg Gly Tyr Asn  Glu Ala Pro Ser Val  Pro Ala Asp
    1085                1090                1095

Tyr Ala  Ser Val Tyr Glu Glu  Lys Ser Tyr Thr Asp  Gly Arg Arg
    1100                1105                1110

Glu Asn  Pro Cys Glu Phe Asn  Arg Gly Tyr Arg Asp  Tyr Thr Pro
    1115                1120                1125

Leu Pro  Val Gly Tyr Val Thr  Lys Glu Leu Glu Tyr  Phe Pro Glu
    1130                1135                1140
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Thr Asp Lys Val Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe
1145 1150 1155

Ile Val Asp Ser Val Glu Leu Leu Leu Met Glu Glu
1160 1165 1170

<210> 27

<211> 3516

<212> DNA

<213> Artificial Sequence

<220>

<223> TIC111 CDS consisting of CDS for Cry1Ac domain I linked in frame to CDS for TIC900 domain II-III linked in frame to CDS for Cry1Ac protoxin domain

<220>

<221> CDS

<222> (1)..(3516)

<223> TIC111 comprising Cry1Ac domain I nt 1-705 (amino acid 1-235); TIC900 domain II-III nt 706-1815 (amino acid 236-605); nt 1816-1821 linker; Cry1Ac protoxin domain nt 1822-3516 (amino acid 608-1172)

<400> 27

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atg gat aac aat ccg aac atc aat gaa tgc att cct tat aat tgt tta       48
Met Asp Asn Asn Pro Asn Ile Asn Glu Cys Ile Pro Tyr Asn Cys Leu
1               5                   10                  15

agt aac cct gaa gta gaa gta tta ggt gga gaa aga ata gaa act ggt       96
Ser Asn Pro Glu Val Glu Val Leu Gly Gly Glu Arg Ile Glu Thr Gly
            20                  25                  30

tac acc cca atc gat att tcc ttg tcg cta acg caa ttt ctt ttg agt      144
Tyr Thr Pro Ile Asp Ile Ser Leu Ser Leu Thr Gln Phe Leu Leu Ser
        35                  40                  45

gaa ttt gtt ccc ggt gct gga ttt gtg tta gga cta gtt gat ata ata      192
Glu Phe Val Pro Gly Ala Gly Phe Val Leu Gly Leu Val Asp Ile Ile
    50                  55                  60

tgg gga att ttt ggt ccc tct caa tgg gac gca ttt ctt gta caa att      240
Trp Gly Ile Phe Gly Pro Ser Gln Trp Asp Ala Phe Leu Val Gln Ile
65                  70                  75                  80

gaa cag tta att aac caa aga ata gaa gaa ttc gct agg aac caa gcc      288
Glu Gln Leu Ile Asn Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala
                85                  90                  95

att tct aga tta gaa gga cta agc aat ctt tat caa att tac gcg gaa      336
Ile Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Gln Ile Tyr Ala Glu
            100                 105                 110

tct ttt aga gag tgg gaa gca gat cct act aat cca gca tta aga gaa      384
Ser Phe Arg Glu Trp Glu Ala Asp Pro Thr Asn Pro Ala Leu Arg Glu
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        115                 120                 125

gag atg cgt att caa ttc aat gac atg aac agt gcc ctt aca acc gct      432
Glu Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Thr Thr Ala
    130                 135                 140

att cct ctt ttt gca gtt caa aat tat caa gtt cct ctt tta tca gta      480
Ile Pro Leu Phe Ala Val Gln Asn Tyr Gln Val Pro Leu Leu Ser Val
145                 150                 155                 160

tat gtt caa gct gca aat tta cat tta tca gtt ttg aga gat gtt tca      528
Tyr Val Gln Ala Ala Asn Leu His Leu Ser Val Leu Arg Asp Val Ser
                165                 170                 175

gtg ttt gga caa agg tgg gga ttt gat gcc gcg act atc aat agt cgt      576
Val Phe Gly Gln Arg Trp Gly Phe Asp Ala Ala Thr Ile Asn Ser Arg
            180                 185                 190

tat aat gat tta act agg ctt att ggc aac tat aca gat cat gct gta      624
Tyr Asn Asp Leu Thr Arg Leu Ile Gly Asn Tyr Thr Asp His Ala Val
        195                 200                 205

cgc tgg tac aat acg gga tta gag cgt gta tgg gga ccg gat tct aga      672
Arg Trp Tyr Asn Thr Gly Leu Glu Arg Val Trp Gly Pro Asp Ser Arg
    210                 215                 220

gat tgg ata aga tat aat caa ttt aga aga gat cta acg ctt act gtt      720
Asp Trp Ile Arg Tyr Asn Gln Phe Arg Arg Asp Leu Thr Leu Thr Val
225                 230                 235                 240

tta gat atc gtt gct tta ttc ccg cac tat gat gta caa act tat cca      768
Leu Asp Ile Val Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro
                245                 250                 255

ata aca acc gtt gct cag tta aca agg gaa gtt tat acg gat cct tta      816
Ile Thr Thr Val Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu
            260                 265                 270

ctt aat ttt aat cct aaa tta cat tct gtg tct caa tta cct agt ttt      864
Leu Asn Phe Asn Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe
        275                 280                 285

agt gac atg gaa aat gca aca att aga act cca cat ctg atg gaa ttt      912
Ser Asp Met Glu Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe
    290                 295                 300

tta aga atg cta aca att tat aca gat tgg tat agt gtg gga aga aac      960
Leu Arg Met Leu Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn
305                 310                 315                 320

tat tat tgg gga gga cat cgc gtg acg tct tac cat gta gga gga gag     1008
Tyr Tyr Trp Gly Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu
                325                 330                 335

aat ata aga tca cct cta tat ggt aga gag gca aat caa gag gtt cct     1056
Asn Ile Arg Ser Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro
            340                 345                 350

aga gat ttt tat ttt tat gga ccc gtt ttt aag acg tta tca aag ccg     1104
Arg Asp Phe Tyr Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro
        355                 360                 365

act cta aga cca tta cag cag cct gca cca gct cct cct ttt aat tta     1152
Thr Leu Arg Pro Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu
    370                 375                 380

cgt agc tta gag gga gta gaa ttc cac act tct aca ggt agt ttt atg     1200
Arg Ser Leu Glu Gly Val Glu Phe His Thr Ser Thr Gly Ser Phe Met
385                 390                 395                 400
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tat cgt gaa aga gga tcg gta gat tct ttt aat gag tta ccg cct ttt     1248
Tyr Arg Glu Arg Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe
                405                 410                 415

aat cca gtt ggg tta cct cat aag gta tac agt cac cgt tta tgt cat     1296
Asn Pro Val Gly Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His
            420                 425                 430

gca acg ttt gtt cgt aaa tct ggg acc cct tat tta aca aca ggt gcc     1344
Ala Thr Phe Val Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala
        435                 440                 445

atc ttt tct tgg aca cat cgt agt gct gaa gaa acc aat aca att gaa     1392
Ile Phe Ser Trp Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu
    450                 455                 460

tca aat att att acg caa atc ccg tta gta aaa gca tat caa att gga     1440
Ser Asn Ile Ile Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly
465                 470                 475                 480

tca ggc act act gta agg aaa gga cca gga ttc aca gga ggg gat ata     1488
Ser Gly Thr Thr Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile
                485                 490                 495

ctt cga aga aca ggt cct gga aca ttt gga gat atg aga ata aat att     1536
Leu Arg Arg Thr Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile
            500                 505                 510

aat gca cca tta tct gaa aga tat cgt gta agg att cgt tat gct tct     1584
Asn Ala Pro Leu Ser Glu Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser
        515                 520                 525

acg aca gat tta caa ttt gtc acg agt att aat ggg gcc acc att aat     1632
Thr Thr Asp Leu Gln Phe Val Thr Ser Ile Asn Gly Ala Thr Ile Asn
    530                 535                 540

att ggt aac ttc cca aaa act att aat aat cta aat act tta ggt tct     1680
Ile Gly Asn Phe Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser
545                 550                 555                 560

gag ggc tat aga aca gta tcg ttt agt act cca ttt agt ttc tca aat     1728
Glu Gly Tyr Arg Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn
                565                 570                 575

gca caa agc ata ttt aga tta ggt ata caa gca ttt tct gga gtt caa     1776
Ala Gln Ser Ile Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln
            580                 585                 590

gaa gtt tat gtg gat aaa att gaa ttt att cct gtt gaa ctc gag gct     1824
Glu Val Tyr Val Asp Lys Ile Glu Phe Ile Pro Val Glu Leu Glu Ala
        595                 600                 605

gaa tat aat ctg gaa aga gcg cag aag gcg gtg aat gcg ctg ttt acg     1872
Glu Tyr Asn Leu Glu Arg Ala Gln Lys Ala Val Asn Ala Leu Phe Thr
    610                 615                 620

tct aca aac caa cta ggg cta aaa aca aat gta acg gat tat cat att     1920
Ser Thr Asn Gln Leu Gly Leu Lys Thr Asn Val Thr Asp Tyr His Ile
625                 630                 635                 640

gat caa gtg tcc aat tta gtt acg tat tta tcg gat gaa ttt tgt ctg     1968
Asp Gln Val Ser Asn Leu Val Thr Tyr Leu Ser Asp Glu Phe Cys Leu
                645                 650                 655

gat gaa aag cga gaa ttg tcc gag aaa gtc aaa cat gcg aag cga ctc     2016
Asp Glu Lys Arg Glu Leu Ser Glu Lys Val Lys His Ala Lys Arg Leu
            660                 665                 670
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agt gat gaa cgc aat tta ctc caa gat tca aat ttc aaa gac att aat     2064
Ser Asp Glu Arg Asn Leu Leu Gln Asp Ser Asn Phe Lys Asp Ile Asn
        675                 680                 685

agg caa cca gaa cgt ggg tgg ggc gga agt aca ggg att acc atc caa     2112
Arg Gln Pro Glu Arg Gly Trp Gly Gly Ser Thr Gly Ile Thr Ile Gln
    690                 695                 700

gga ggg gat gac gta ttt aaa gaa aat tac gtc aca cta tca ggt acc     2160
Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val Thr Leu Ser Gly Thr
705                 710                 715                 720

ttt gat gag tgc tat cca aca tat ttg tat caa aaa atc gat gaa tca     2208
Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln Lys Ile Asp Glu Ser
                725                 730                 735

aaa tta aaa gcc ttt acc cgt tat caa tta aga ggg tat atc gaa gat     2256
Lys Leu Lys Ala Phe Thr Arg Tyr Gln Leu Arg Gly Tyr Ile Glu Asp
            740                 745                 750

agt caa gac tta gaa atc tat tta att cgc tac aat gca aaa cat gaa     2304
Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr Asn Ala Lys His Glu
        755                 760                 765

aca gta aat gtg cca ggt acg ggt tcc tta tgg ccg ctt tca gcc caa     2352
Thr Val Asn Val Pro Gly Thr Gly Ser Leu Trp Pro Leu Ser Ala Gln
    770                 775                 780

agt cca atc gga aag tgt gga gag ccg aat cga tgc gcg cca cac ctt     2400
Ser Pro Ile Gly Lys Cys Gly Glu Pro Asn Arg Cys Ala Pro His Leu
785                 790                 795                 800

gaa tgg aat cct gac tta gat tgt tcg tgt agg gat gga gaa aag tgt     2448
Glu Trp Asn Pro Asp Leu Asp Cys Ser Cys Arg Asp Gly Glu Lys Cys
                805                 810                 815

gcc cat cat tcg cat cat ttc tcc tta gac att gat gta gga tgt aca     2496
Ala His His Ser His His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr
            820                 825                 830

gac tta aat gag gac cta ggt gta tgg gtg atc ttt aag att aag acg     2544
Asp Leu Asn Glu Asp Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr
        835                 840                 845

caa gat ggg cac gca aga cta ggg aat cta gag ttt ctc gaa gag aaa     2592
Gln Asp Gly His Ala Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys
    850                 855                 860

cca tta gta gga gaa gcg cta gct cgt gtg aaa aga gcg gag aaa aaa     2640
Pro Leu Val Gly Glu Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys
865                 870                 875                 880

tgg aga gac aaa cgt gaa aaa ttg gaa tgg gaa aca aat atc gtt tat     2688
Trp Arg Asp Lys Arg Glu Lys Leu Glu Trp Glu Thr Asn Ile Val Tyr
                885                 890                 895

aaa gag gca aaa gaa tct gta gat gct tta ttt gta aac tct caa tat     2736
Lys Glu Ala Lys Glu Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr
            900                 905                 910

gat caa tta caa gcg gat acg aat att gcc atg att cat gcg gca gat     2784
Asp Gln Leu Gln Ala Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp
        915                 920                 925

aaa cgt gtt cat agc att cga gaa gct tat ctg cct gag ctg tct gtg     2832
Lys Arg Val His Ser Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val
    930                 935                 940

att ccg ggt gtc aat gcg gct att ttt gaa gaa tta gaa ggg cgt att     2880
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Ile Pro Gly Val Asn Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile
945                 950                 955                 960

ttc act gca ttc tcc cta tat gat gcg aga aat gtc att aaa aat ggt     2928
Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly
                965                 970                 975

gat ttt aat aat ggc tta tcc tgc tgg aac gtg aaa ggg cat gta gat     2976
Asp Phe Asn Asn Gly Leu Ser Cys Trp Asn Val Lys Gly His Val Asp
            980                 985                 990

gta gaa gaa caa aac aac caa cgt  tcg gtc ctt gtt gtt  ccg gaa tgg   3024
Val Glu Glu Gln Asn Asn Gln Arg  Ser Val Leu Val Val  Pro Glu Trp
        995                 1000                1005

gaa gca  gaa gtg tca caa gaa  gtt cgt gtc tgt ccg  ggt cgt ggc      3069
Glu Ala  Glu Val Ser Gln Glu  Val Arg Val Cys Pro  Gly Arg Gly
    1010                1015                1020

tat atc  ctt cgt gtc aca gcg  tac aag gag gga tat  gga gaa ggt      3114
Tyr Ile  Leu Arg Val Thr Ala  Tyr Lys Glu Gly Tyr  Gly Glu Gly
    1025                1030                1035

tgc gta  acc att cat gag atc  gag aac aat aca gac  gaa ctg aag      3159
Cys Val  Thr Ile His Glu Ile  Glu Asn Asn Thr Asp  Glu Leu Lys
    1040                1045                1050

ttt agc  aac tgc gta gaa gag  gaa atc tat cca aat  aac acg gta      3204
Phe Ser  Asn Cys Val Glu Glu  Glu Ile Tyr Pro Asn  Asn Thr Val
    1055                1060                1065

acg tgt  aat gat tat act gta  aat caa gaa gaa tac  gga ggt gcg      3249
Thr Cys  Asn Asp Tyr Thr Val  Asn Gln Glu Glu Tyr  Gly Gly Ala
    1070                1075                1080

tac act  tct cgt aat cga gga  tat aac gaa gct cct  tcc gta cca      3294
Tyr Thr  Ser Arg Asn Arg Gly  Tyr Asn Glu Ala Pro  Ser Val Pro
    1085                1090                1095

gct gat  tat gcg tca gtc tat  gaa gaa aaa tcg tat  aca gat gga      3339
Ala Asp  Tyr Ala Ser Val Tyr  Glu Glu Lys Ser Tyr  Thr Asp Gly
    1100                1105                1110

cga aga  gag aat cct tgt gaa  ttt aac aga ggg tat  agg gat tac      3384
Arg Arg  Glu Asn Pro Cys Glu  Phe Asn Arg Gly Tyr  Arg Asp Tyr
    1115                1120                1125

acg cca  cta cca gtt ggt tat  gtg aca aaa gaa tta  gaa tac ttc      3429
Thr Pro  Leu Pro Val Gly Tyr  Val Thr Lys Glu Leu  Glu Tyr Phe
    1130                1135                1140

cca gaa  acc gat aag gta tgg  att gag att gga gaa  acg gaa gga      3474
Pro Glu  Thr Asp Lys Val Trp  Ile Glu Ile Gly Glu  Thr Glu Gly
    1145                1150                1155

aca ttt  atc gtg gac agc gtg  gaa tta ctc ctt atg  gag gaa        3516
Thr Phe  Ile Val Asp Ser Val  Glu Leu Leu Leu Met  Glu Glu
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<400> 28

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Ser Asn Pro Glu Val Glu Val Leu Gly Gly Glu Arg Ile Glu Thr Gly
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Tyr Thr Pro Ile Asp Ile Ser Leu Ser Leu Thr Gln Phe Leu Leu Ser
        35                  40                  45

Glu Phe Val Pro Gly Ala Gly Phe Val Leu Gly Leu Val Asp Ile Ile
    50                  55                  60

Trp Gly Ile Phe Gly Pro Ser Gln Trp Asp Ala Phe Leu Val Gln Ile
65                  70                  75                  80

Glu Gln Leu Ile Asn Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala
                85                  90                  95

Ile Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Gln Ile Tyr Ala Glu
            100                 105                 110

Ser Phe Arg Glu Trp Glu Ala Asp Pro Thr Asn Pro Ala Leu Arg Glu
        115                 120                 125

Glu Met Arg Ile Gln Phe Asn Asp Met Asn Ser Ala Leu Thr Thr Ala
    130                 135                 140

Ile Pro Leu Phe Ala Val Gln Asn Tyr Gln Val Pro Leu Leu Ser Val
145                 150                 155                 160

Tyr Val Gln Ala Ala Asn Leu His Leu Ser Val Leu Arg Asp Val Ser
                165                 170                 175

Val Phe Gly Gln Arg Trp Gly Phe Asp Ala Ala Thr Ile Asn Ser Arg
            180                 185                 190

Tyr Asn Asp Leu Thr Arg Leu Ile Gly Asn Tyr Thr Asp His Ala Val
        195                 200                 205

Arg Trp Tyr Asn Thr Gly Leu Glu Arg Val Trp Gly Pro Asp Ser Arg
    210                 215                 220

Asp Trp Ile Arg Tyr Asn Gln Phe Arg Arg Asp Leu Thr Leu Thr Val
225                 230                 235                 240
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Leu Asp Ile Val Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro
               245                 250                 255

Ile Thr Thr Val Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu
           260                 265                 270

Leu Asn Phe Asn Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe
       275                 280                 285

Ser Asp Met Glu Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe
   290                 295                 300

Leu Arg Met Leu Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn
305                 310                 315                 320

Tyr Tyr Trp Gly Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu
               325                 330                 335

Asn Ile Arg Ser Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro
           340                 345                 350

Arg Asp Phe Tyr Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro
       355                 360                 365

Thr Leu Arg Pro Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu
   370                 375                 380

Arg Ser Leu Glu Gly Val Glu Phe His Thr Ser Thr Gly Ser Phe Met
385                 390                 395                 400

Tyr Arg Glu Arg Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe
               405                 410                 415

Asn Pro Val Gly Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His
           420                 425                 430

Ala Thr Phe Val Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala
       435                 440                 445

Ile Phe Ser Trp Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu
   450                 455                 460

Ser Asn Ile Ile Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly
465                 470                 475                 480

Ser Gly Thr Thr Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile
               485                 490                 495

Leu Arg Arg Thr Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile
           500                 505                 510

Asn Ala Pro Leu Ser Glu Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser
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515 520 525

Thr Thr Asp Leu Gln Phe Val Thr Ser Ile Asn Gly Ala Thr Ile Asn
530 535 540

Ile Gly Asn Phe Pro Lys Thr Ile Asn Asn Leu Asn Thr Leu Gly Ser
545 550 555 560

Glu Gly Tyr Arg Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asn
565 570 575

Ala Gln Ser Ile Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln
580 585 590

Glu Val Tyr Val Asp Lys Ile Glu Phe Ile Pro Val Glu Leu Glu Ala
595 600 605

Glu Tyr Asn Leu Glu Arg Ala Gln Lys Ala Val Asn Ala Leu Phe Thr
610 615 620

Ser Thr Asn Gln Leu Gly Leu Lys Thr Asn Val Thr Asp Tyr His Ile
625 630 635 640

Asp Gln Val Ser Asn Leu Val Thr Tyr Leu Ser Asp Glu Phe Cys Leu
645 650 655

Asp Glu Lys Arg Glu Leu Ser Glu Lys Val Lys His Ala Lys Arg Leu
660 665 670

Ser Asp Glu Arg Asn Leu Leu Gln Asp Ser Asn Phe Lys Asp Ile Asn
675 680 685

Arg Gln Pro Glu Arg Gly Trp Gly Gly Ser Thr Gly Ile Thr Ile Gln
690 695 700

Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val Thr Leu Ser Gly Thr
705 710 715 720

Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln Lys Ile Asp Glu Ser
725 730 735

Lys Leu Lys Ala Phe Thr Arg Tyr Gln Leu Arg Gly Tyr Ile Glu Asp
740 745 750

Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr Asn Ala Lys His Glu
755 760 765

Thr Val Asn Val Pro Gly Thr Gly Ser Leu Trp Pro Leu Ser Ala Gln
770 775 780

Ser Pro Ile Gly Lys Cys Gly Glu Pro Asn Arg Cys Ala Pro His Leu
785 790 795 800

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Glu Trp Asn Pro Asp Leu Asp Cys Ser Cys Arg Asp Gly Glu Lys Cys
                805                 810                 815

Ala His His Ser His His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr
            820                 825                 830

Asp Leu Asn Glu Asp Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr
        835                 840                 845

Gln Asp Gly His Ala Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys
    850                 855                 860

Pro Leu Val Gly Glu Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys
865                 870                 875                 880

Trp Arg Asp Lys Arg Glu Lys Leu Glu Trp Glu Thr Asn Ile Val Tyr
                885                 890                 895

Lys Glu Ala Lys Glu Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr
            900                 905                 910

Asp Gln Leu Gln Ala Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp
        915                 920                 925

Lys Arg Val His Ser Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val
    930                 935                 940

Ile Pro Gly Val Asn Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile
945                 950                 955                 960

Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly
                965                 970                 975

Asp Phe Asn Asn Gly Leu Ser Cys Trp Asn Val Lys Gly His Val Asp
            980                 985                 990

Val Glu Glu Gln Asn Asn Gln Arg  Ser Val Leu Val Val  Pro Glu Trp
        995                 1000                1005

Glu Ala  Glu Val Ser Gln Glu  Val Arg Val Cys Pro  Gly Arg Gly
    1010                1015                1020

Tyr Ile  Leu Arg Val Thr Ala  Tyr Lys Glu Gly Tyr  Gly Glu Gly
    1025                1030                1035

Cys Val  Thr Ile His Glu Ile  Glu Asn Asn Thr Asp  Glu Leu Lys
    1040                1045                1050

Phe Ser  Asn Cys Val Glu Glu  Glu Ile Tyr Pro Asn  Asn Thr Val
    1055                1060                1065
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Thr Cys Asn Asp Tyr Thr Val Asn Gln Glu Glu Tyr Gly Gly Ala
1070 1075 1080

Tyr Thr Ser Arg Asn Arg Gly Tyr Asn Glu Ala Pro Ser Val Pro
1085 1090 1095

Ala Asp Tyr Ala Ser Val Tyr Glu Glu Lys Ser Tyr Thr Asp Gly
1100 1105 1110

Arg Arg Glu Asn Pro Cys Glu Phe Asn Arg Gly Tyr Arg Asp Tyr
1115 1120 1125

Thr Pro Leu Pro Val Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe
1130 1135 1140

Pro Glu Thr Asp Lys Val Trp Ile Glu Ile Gly Glu Thr Glu Gly
1145 1150 1155

Thr Phe Ile Val Asp Ser Val Glu Leu Leu Leu Met Glu Glu
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<223> TIC434 CDS

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ctcgtgtatg agagcttgtc ctgaatcgaa agccgcccta gagctactaa catctaggtt 180

cgaggatcag gctgctcagc ctgcgagtag ggagtcccgc acgttcactg agaaacactc 240

taagttatgt ggtaagtcca caggaggaat aagaattgtc ccaaatgatc ctaacatcat 300

tatctagaaa tatcttgaga cgtccaagta ttttatttat tacaggactc ttattaaaga 360

aaaaatctaa gtctgaaata ggacttaaat attaatatac gaggaggaag aggt atg 417
Met
1

aat tca aag gaa cat gat tat cta aaa gtt tgt aat gat tta agt gac 465
Asn Ser Lys Glu His Asp Tyr Leu Lys Val Cys Asn Asp Leu Ser Asp
5 10 15

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gcc aat att aat atg gag cgg ttt gat aag aat gat gca ctg gaa att      513
Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu Ile
        20                  25                  30

ggt atg tct att gta tct gag ctc ctt ggt atg att cca ggt gga aaa      561
Gly Met Ser Ile Val Ser Glu Leu Leu Gly Met Ile Pro Gly Gly Lys
    35                  40                  45

gcc ttg caa ttt gtg ttt gat caa ttg tgg tct cgt ttg ggt gat tct      609
Ala Leu Gln Phe Val Phe Asp Gln Leu Trp Ser Arg Leu Gly Asp Ser
50                  55                  60                  65

gga tgg agt gcg ttc atg gaa cat gtg gag gaa tta att gat act aaa      657
Gly Trp Ser Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr Lys
                70                  75                  80

ata gaa ggg tat gca aaa aat aaa gcc tta tct gaa tta gca ggt ata      705
Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly Ile
            85                  90                  95

caa aga aac ctt gaa aca tat ata caa tta cgt aat gaa tgg gaa aat      753
Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu Asn
        100                 105                 110

gat atc gaa aac tca aag gct caa gtt aag gta gct aat tac tat gaa      801
Asp Ile Glu Asn Ser Lys Ala Gln Val Lys Val Ala Asn Tyr Tyr Glu
    115                 120                 125

agt ctt gag cag gcg gtt gaa agg agt atg cct caa ttt gca gtg ggg      849
Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val Gly
130                 135                 140                 145

aat ttt gaa gta cca ctt tta act gtt tat gtg caa gct gct aat ctt      897
Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn Leu
                150                 155                 160

cat ata tta tta tta aga gat gtt cta att tat gga aag cgt tgg gga      945
His Ile Leu Leu Leu Arg Asp Val Leu Ile Tyr Gly Lys Arg Trp Gly
            165                 170                 175

tgg tcg gag cag aaa att aaa att tat tat gat aga cag att aag tat      993
Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Arg Gln Ile Lys Tyr
        180                 185                 190

acc cat gaa tac aca aat cat tgt gta aat tgg tat aat aaa gga ctt     1041
Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly Leu
    195                 200                 205

gag aga tta aaa aat aaa ggt tct tct tat caa gat tgg tac aat tat     1089
Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn Tyr
210                 215                 220                 225

aat cgt ttc cgt aga gaa atg act ctt act gtt tta gat atc gtt gct     1137
Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val Ala
                230                 235                 240

tta ttc ccg cac tat gat gta caa act tat cca ata aca acc gtt gct     1185
Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val Ala
            245                 250                 255

cag cta aca agg gaa gtt tat acg gat cct tta ctt aat ttt aat cct     1233
Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn Pro
        260                 265                 270

aaa tta cat tct gtg tct caa tta cct agt ttt agt gac atg gaa aat     1281
Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu Asn
    275                 280                 285
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gca aca att aga acc cca cat cta atg gaa ttt tta aga atg cta aca     1329
Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu Thr
290                 295                 300                 305

att tat aca gat tgg tat agt gtg gga aga aac tat tat tgg gga gga     1377
Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly Gly
                310                 315                 320

cat cgc gtg acg tct tac cat gta gga gga gag aat ata aga tca cct     1425
His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser Pro
            325                 330                 335

cta tat ggt aga gag gca aat caa gag gtt cct aga gat ttt tat ttt     1473
Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr Phe
        340                 345                 350

tat gga ccc gtt ttt aag acg tta tca aag ccg act cta aga cca tta     1521
Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro Leu
    355                 360                 365

cag cag cct gca cca gct cct ccc ttt aat tta cgt agc tta gag gga     1569
Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu Gly
370                 375                 380                 385

gta gaa ttc cac act cct aca ggt agt ttt ttg tat cgt gaa aga gga     1617
Val Glu Phe His Thr Pro Thr Gly Ser Phe Leu Tyr Arg Glu Arg Gly
                390                 395                 400

tcg gta gat tct ttt aat gag tta ccg cct ttt aat cta gtt ggg tta     1665
Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Leu Val Gly Leu
            405                 410                 415

cct cat aag gta tac agt cac cgt tta tgt cat gca acg ttt gtt cgt     1713
Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val Arg
        420                 425                 430

aaa tct ggg acc cct tat tta aca aca ggt gcc atc ttt tct tgg aca     1761
Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp Thr
    435                 440                 445

cat cgt agt gct gaa gaa acc aat aca att gaa tca aat atc att acg     1809
His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile Thr
450                 455                 460                 465

caa atc ccg tta gta aaa gca tat caa att gga tcg ggc act act gta     1857
Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr Val
                470                 475                 480

agg aaa gga cca gga ttc aca gga ggg gat ata ctt cga aga aca ggt     1905
Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr Gly
            485                 490                 495

cct gga aca ttt gga gat atg aga ata aat att aat gca cca tta tct     1953
Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu Ser
        500                 505                 510

caa aga tat cgt gta agg att cgt tat gct tct acg aca gat tta caa     2001
Gln Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu Gln
    515                 520                 525

ttt ttc acg agc att aat gga acc act att aat atc ggc aat ttc ccc     2049
Phe Phe Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe Pro
530                 535                 540                 545

aaa act att aat aat gtg aat cct tta agt tct gag agc tat aga aca     2097
Lys Thr Ile Asn Asn Val Asn Pro Leu Ser Ser Glu Ser Tyr Arg Thr
                550                 555                 560

gta tct ttt agt acg cca ttt agt ttt tca gat gca caa agt ata ttt     2145
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Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asp Ala Gln Ser Ile Phe
565 570 575

aga tta ggt ata caa gct ttt tct gga gtt caa gaa gtt tat gtg gat 2193
Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val Asp
580 585 590

aaa att gaa ttt atc cct ttt gaa gta gga ttc aat aat aca atc 2238
Lys Ile Glu Phe Ile Pro Phe Glu Val Gly Phe Asn Asn Thr Ile
595 600 605

tagaaagagc acagaagatt taaaatcaga tagaatgtat taacatatta atcaagcatc 2298

taatttaata gaatgtttat cgaatgaatt ctgtttagat aaaaagatag gattgttcga 2358

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tatggccatg gttcgtttaa tgttacaagc aggccttcga attggtgaag ttgcaaatct 7518

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<212> PRT

<213> Bacillus thuringiensis

<400> 30

Met Asn Ser Lys Glu His Asp Tyr Leu Lys Val Cys Asn Asp Leu Ser
1 5 10 15

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Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
            20                  25                  30

Ile Gly Met Ser Ile Val Ser Glu Leu Leu Gly Met Ile Pro Gly Gly
        35                  40                  45

Lys Ala Leu Gln Phe Val Phe Asp Gln Leu Trp Ser Arg Leu Gly Asp
    50                  55                  60

Ser Gly Trp Ser Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65                  70                  75                  80

Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
                85                  90                  95

Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
            100                 105                 110

Asn Asp Ile Glu Asn Ser Lys Ala Gln Val Lys Val Ala Asn Tyr Tyr
        115                 120                 125

Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
    130                 135                 140

Gly Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145                 150                 155                 160

Leu His Ile Leu Leu Leu Arg Asp Val Leu Ile Tyr Gly Lys Arg Trp
                165                 170                 175

Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Arg Gln Ile Lys
            180                 185                 190

Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
        195                 200                 205

Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
    210                 215                 220

Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225                 230                 235                 240

Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
                245                 250                 255

Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
            260                 265                 270

Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
        275                 280                 285
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Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
    290                 295                 300

Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305                 310                 315                 320

Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
                325                 330                 335

Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
            340                 345                 350

Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
        355                 360                 365

Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
    370                 375                 380

Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Leu Tyr Arg Glu Arg
385                 390                 395                 400

Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Leu Val Gly
                405                 410                 415

Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
            420                 425                 430

Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp
        435                 440                 445

Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
    450                 455                 460

Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465                 470                 475                 480

Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
                485                 490                 495

Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
            500                 505                 510

Ser Gln Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
        515                 520                 525

Gln Phe Phe Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
    530                 535                 540

Pro Lys Thr Ile Asn Asn Val Asn Pro Leu Ser Ser Glu Ser Tyr Arg
545                 550                 555                 560

Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asp Ala Gln Ser Ile
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565 570 575

Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val
580 585 590

Asp Lys Ile Glu Phe Ile Pro Phe Glu Val Gly Phe Asn Asn Thr Ile
595 600 605

<210> 31

<211> 3525

<212> DNA

<213> Artificial

<220>

<221> CDS

<222> (1)..(3525)

<223> TIC435 CDS; 1-1825 corresponds to TIC434 CDS; 1826-3525 corresponds to Cry1 protoxin

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Met Asn Ser Lys Glu His Asp Tyr Leu Lys Val Cys Asn Asp Leu Ser
1               5                   10                  15

gac gcc aat att aat atg gag cgg ttt gat aag aat gat gca ctg gaa       96
Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
            20                  25                  30

att ggt atg tct att gta tct gag ctc ctt ggt atg att cca ggt gga      144
Ile Gly Met Ser Ile Val Ser Glu Leu Leu Gly Met Ile Pro Gly Gly
        35                  40                  45

aaa gcc ttg caa ttt gtg ttt gat caa ttg tgg tct cgt ttg ggt gat      192
Lys Ala Leu Gln Phe Val Phe Asp Gln Leu Trp Ser Arg Leu Gly Asp
    50                  55                  60

tct gga tgg agt gcg ttc atg gaa cat gtg gag gaa tta att gat act      240
Ser Gly Trp Ser Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65                  70                  75                  80

aaa ata gaa ggg tat gca aaa aat aaa gcc tta tct gaa tta gca ggt      288
Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
                85                  90                  95

ata caa aga aac ctt gaa aca tat ata caa tta cgt aat gaa tgg gaa      336
Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
            100                 105                 110

aat gat atc gaa aac tca aag gct caa gtt aag gta gct aat tac tat      384
Asn Asp Ile Glu Asn Ser Lys Ala Gln Val Lys Val Ala Asn Tyr Tyr
        115                 120                 125

gaa agt ctt gag cag gcg gtt gaa agg agt atg cct caa ttt gca gtg      432
Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
    130                 135                 140
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ggg aat ttt gaa gta cca ctt tta act gtt tat gtg caa gct gct aat      480
Gly Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145                 150                 155                 160

ctt cat ata tta tta tta aga gat gtt cta att tat gga aag cgt tgg      528
Leu His Ile Leu Leu Leu Arg Asp Val Leu Ile Tyr Gly Lys Arg Trp
                165                 170                 175

gga tgg tcg gag cag aaa att aaa att tat tat gat aga cag att aag      576
Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Arg Gln Ile Lys
            180                 185                 190

tat acc cat gaa tac aca aat cat tgt gta aat tgg tat aat aaa gga      624
Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
        195                 200                 205

ctt gag aga tta aaa aat aaa ggt tct tct tat caa gat tgg tac aat      672
Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
    210                 215                 220

tat aat cgt ttc cgt aga gaa atg act ctt act gtt tta gat atc gtt      720
Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225                 230                 235                 240

gct tta ttc ccg cac tat gat gta caa act tat cca ata aca acc gtt      768
Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
                245                 250                 255

gct cag cta aca agg gaa gtt tat acg gat cct tta ctt aat ttt aat      816
Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
            260                 265                 270

cct aaa tta cat tct gtg tct caa tta cct agt ttt agt gac atg gaa      864
Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
        275                 280                 285

aat gca aca att aga acc cca cat cta atg gaa ttt tta aga atg cta      912
Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
    290                 295                 300

aca att tat aca gat tgg tat agt gtg gga aga aac tat tat tgg gga      960
Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305                 310                 315                 320

gga cat cgc gtg acg tct tac cat gta gga gga gag aat ata aga tca     1008
Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
                325                 330                 335

cct cta tat ggt aga gag gca aat caa gag gtt cct aga gat ttt tat     1056
Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
            340                 345                 350

ttt tat gga ccc gtt ttt aag acg tta tca aag ccg act cta aga cca     1104
Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
        355                 360                 365

tta cag cag cct gca cca gct cct ccc ttt aat tta cgt agc tta gag     1152
Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
    370                 375                 380

gga gta gaa ttc cac act cct aca ggt agt ttt ttg tat cgt gaa aga     1200
Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Leu Tyr Arg Glu Arg
385                 390                 395                 400

gga tcg gta gat tct ttt aat gag tta ccg cct ttt aat cta gtt ggg     1248
Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Leu Val Gly
                405                 410                 415

tta cct cat aag gta tac agt cac cgt tta tgt cat gca acg ttt gtt     1296
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Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
            420                 425                 430

cgt aaa tct ggg acc cct tat tta aca aca ggt gcc atc ttt tct tgg    1344
Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp
        435                 440                 445

aca cat cgt agt gct gaa gaa acc aat aca att gaa tca aat atc att    1392
Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
    450                 455                 460

acg caa atc ccg tta gta aaa gca tat caa att gga tcg ggc act act    1440
Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465                 470                 475                 480

gta agg aaa gga cca gga ttc aca gga ggg gat ata ctt cga aga aca    1488
Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
                485                 490                 495

ggt cct gga aca ttt gga gat atg aga ata aat att aat gca cca tta    1536
Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
            500                 505                 510

tct caa aga tat cgt gta agg att cgt tat gct tct acg aca gat tta    1584
Ser Gln Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
        515                 520                 525

caa ttt ttc acg agc att aat gga acc act att aat atc ggc aat ttc    1632
Gln Phe Phe Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
    530                 535                 540

ccc aaa act att aat aat gtg aat cct tta agt tct gag agc tat aga    1680
Pro Lys Thr Ile Asn Asn Val Asn Pro Leu Ser Ser Glu Ser Tyr Arg
545                 550                 555                 560

aca gta tct ttt agt acg cca ttt agt ttt tca gat gca caa agt ata    1728
Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asp Ala Gln Ser Ile
                565                 570                 575

ttt aga tta ggt ata caa gct ttt tct gga gtt caa gaa gtt tat gtg    1776
Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val
            580                 585                 590

gat aaa att gaa ttt atc cct ttt gaa gta gga ttc aat aat aca atc    1824
Asp Lys Ile Glu Phe Ile Pro Phe Glu Val Gly Phe Asn Asn Thr Ile
        595                 600                 605

ctc gag gct gaa tat aat ctg gaa aga gcg cag aag gcg gtg aat gcg    1872
Leu Glu Ala Glu Tyr Asn Leu Glu Arg Ala Gln Lys Ala Val Asn Ala
    610                 615                 620

ctg ttt acg tct aca aac caa cta ggg cta aaa aca aat gta acg gat    1920
Leu Phe Thr Ser Thr Asn Gln Leu Gly Leu Lys Thr Asn Val Thr Asp
625                 630                 635                 640

tat cat att gat caa gtg tcc aat tta gtt acg tat tta tcg gat gaa    1968
Tyr His Ile Asp Gln Val Ser Asn Leu Val Thr Tyr Leu Ser Asp Glu
                645                 650                 655

ttt tgt ctg gat gaa aag cga gaa ttg tcc gag aaa gtc aaa cat gcg    2016
Phe Cys Leu Asp Glu Lys Arg Glu Leu Ser Glu Lys Val Lys His Ala
            660                 665                 670

aag cga ctc agt gat gaa cgc aat tta ctc caa gat tca aat ttc aaa    2064
Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Ser Asn Phe Lys
        675                 680                 685

gac att aat agg caa cca gaa cgt ggg tgg ggc gga agt aca ggg att    2112
Asp Ile Asn Arg Gln Pro Glu Arg Gly Trp Gly Gly Ser Thr Gly Ile
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    690                 695                 700

acc atc caa gga ggg gat gac gta ttt aaa gaa aat tac gtc aca cta      2160
Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val Thr Leu
705                 710                 715                 720

tca ggt acc ttt gat gag tgc tat cca aca tat ttg tat caa aaa atc      2208
Ser Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln Lys Ile
                725                 730                 735

gat gaa tca aaa tta aaa gcc ttt acc cgt tat caa tta aga ggg tat      2256
Asp Glu Ser Lys Leu Lys Ala Phe Thr Arg Tyr Gln Leu Arg Gly Tyr
            740                 745                 750

atc gaa gat agt caa gac tta gaa atc tat tta att cgc tac aat gca      2304
Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr Asn Ala
        755                 760                 765

aaa cat gaa aca gta aat gtg cca ggt acg ggt tcc tta tgg ccg ctt      2352
Lys His Glu Thr Val Asn Val Pro Gly Thr Gly Ser Leu Trp Pro Leu
    770                 775                 780

tca gcc caa agt cca atc gga aag tgt gga gag ccg aat cga tgc gcg      2400
Ser Ala Gln Ser Pro Ile Gly Lys Cys Gly Glu Pro Asn Arg Cys Ala
785                 790                 795                 800

cca cac ctt gaa tgg aat cct gac tta gat tgt tcg tgt agg gat gga      2448
Pro His Leu Glu Trp Asn Pro Asp Leu Asp Cys Ser Cys Arg Asp Gly
                805                 810                 815

gaa aag tgt gcc cat cat tcg cat cat ttc tcc tta gac att gat gta      2496
Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp Ile Asp Val
            820                 825                 830

gga tgt aca gac tta aat gag gac cta ggt gta tgg gtg atc ttt aag      2544
Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val Ile Phe Lys
        835                 840                 845

att aag acg caa gat ggg cac gca aga cta ggg aat cta gag ttt ctc      2592
Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu Glu Phe Leu
    850                 855                 860

gaa gag aaa cca tta gta gga gaa gcg cta gct cgt gtg aaa aga gcg      2640
Glu Glu Lys Pro Leu Val Gly Glu Ala Leu Ala Arg Val Lys Arg Ala
865                 870                 875                 880

gag aaa aaa tgg aga gac aaa cgt gaa aaa ttg gaa tgg gaa aca aat      2688
Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys Leu Glu Trp Glu Thr Asn
                885                 890                 895

atc gtt tat aaa gag gca aaa gaa tct gta gat gct tta ttt gta aac      2736
Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu Phe Val Asn
            900                 905                 910

tct caa tat gat caa tta caa gcg gat acg aat att gcc atg att cat      2784
Ser Gln Tyr Asp Gln Leu Gln Ala Asp Thr Asn Ile Ala Met Ile His
        915                 920                 925

gcg gca gat aaa cgt gtt cat agc att cga gaa gct tat ctg cct gag      2832
Ala Ala Asp Lys Arg Val His Ser Ile Arg Glu Ala Tyr Leu Pro Glu
    930                 935                 940

ctg tct gtg att ccg ggt gtc aat gcg gct att ttt gaa gaa tta gaa      2880
Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu Glu Leu Glu
945                 950                 955                 960

ggg cgt att ttc act gca ttc tcc cta tat gat gcg aga aat gtc att      2928
Gly Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg Asn Val Ile
                965                 970                 975
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aaa aat ggt gat ttt aat aat ggc tta tcc tgc tgg aac gtg aaa ggg      2976
Lys Asn Gly Asp Phe Asn Asn Gly Leu Ser Cys Trp Asn Val Lys Gly
            980                 985                 990

cat gta gat gta gaa gaa caa aac  aac caa cgt tcg gtc  ctt gtt gtt   3024
His Val Asp Val Glu Glu Gln Asn  Asn Gln Arg Ser Val  Leu Val Val
        995                 1000                1005

ccg gaa  tgg gaa gca gaa gtg  tca caa gaa gtt cgt  gtc tgt ccg      3069
Pro Glu  Trp Glu Ala Glu Val  Ser Gln Glu Val Arg  Val Cys Pro
    1010                1015                1020

ggt cgt  ggc tat atc ctt cgt  gtc aca gcg tac aag  gag gga tat      3114
Gly Arg  Gly Tyr Ile Leu Arg  Val Thr Ala Tyr Lys  Glu Gly Tyr
    1025                1030                1035

gga gaa  ggt tgc gta acc att  cat gag atc gag aac  aat aca gac      3159
Gly Glu  Gly Cys Val Thr Ile  His Glu Ile Glu Asn  Asn Thr Asp
    1040                1045                1050

gaa ctg  aag ttt agc aac tgc  gta gaa gag gaa atc  tat cca aat      3204
Glu Leu  Lys Phe Ser Asn Cys  Val Glu Glu Glu Ile  Tyr Pro Asn
    1055                1060                1065

aac acg  gta acg tgt aat gat  tat act gta aat caa  gaa gaa tac      3249
Asn Thr  Val Thr Cys Asn Asp  Tyr Thr Val Asn Gln  Glu Glu Tyr
    1070                1075                1080

gga ggt  gcg tac act tct cgt  aat cga gga tat aac  gaa gct cct      3294
Gly Gly  Ala Tyr Thr Ser Arg  Asn Arg Gly Tyr Asn  Glu Ala Pro
    1085                1090                1095

tcc gta  cca gct gat tat gcg  tca gtc tat gaa gaa  aaa tcg tat      3339
Ser Val  Pro Ala Asp Tyr Ala  Ser Val Tyr Glu Glu  Lys Ser Tyr
    1100                1105                1110

aca gat  gga cga aga gag aat  cct tgt gaa ttt aac  aga ggg tat      3384
Thr Asp  Gly Arg Arg Glu Asn  Pro Cys Glu Phe Asn  Arg Gly Tyr
    1115                1120                1125

agg gat  tac acg cca cta cca  gtt ggt tat gtg aca  aaa gaa tta      3429
Arg Asp  Tyr Thr Pro Leu Pro  Val Gly Tyr Val Thr  Lys Glu Leu
    1130                1135                1140

gaa tac  ttc cca gaa acc gat  aag gta tgg att gag  att gga gaa      3474
Glu Tyr  Phe Pro Glu Thr Asp  Lys Val Trp Ile Glu  Ile Gly Glu
    1145                1150                1155

acg gaa  gga aca ttt atc gtg  gac agc gtg gaa tta  ctc ctt atg      3519
Thr Glu  Gly Thr Phe Ile Val  Asp Ser Val Glu Leu  Leu Leu Met
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Glu Glu
    1175
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Asp Ala Asn Ile Asn Met Glu Arg Phe Asp Lys Asn Asp Ala Leu Glu
            20                  25                  30

Ile Gly Met Ser Ile Val Ser Glu Leu Leu Gly Met Ile Pro Gly Gly
        35                  40                  45

Lys Ala Leu Gln Phe Val Phe Asp Gln Leu Trp Ser Arg Leu Gly Asp
    50                  55                  60

Ser Gly Trp Ser Ala Phe Met Glu His Val Glu Glu Leu Ile Asp Thr
65                  70                  75                  80

Lys Ile Glu Gly Tyr Ala Lys Asn Lys Ala Leu Ser Glu Leu Ala Gly
                85                  90                  95

Ile Gln Arg Asn Leu Glu Thr Tyr Ile Gln Leu Arg Asn Glu Trp Glu
            100                 105                 110

Asn Asp Ile Glu Asn Ser Lys Ala Gln Val Lys Val Ala Asn Tyr Tyr
        115                 120                 125

Glu Ser Leu Glu Gln Ala Val Glu Arg Ser Met Pro Gln Phe Ala Val
    130                 135                 140

Gly Asn Phe Glu Val Pro Leu Leu Thr Val Tyr Val Gln Ala Ala Asn
145                 150                 155                 160

Leu His Ile Leu Leu Leu Arg Asp Val Leu Ile Tyr Gly Lys Arg Trp
                165                 170                 175

Gly Trp Ser Glu Gln Lys Ile Lys Ile Tyr Tyr Asp Arg Gln Ile Lys
            180                 185                 190

Tyr Thr His Glu Tyr Thr Asn His Cys Val Asn Trp Tyr Asn Lys Gly
        195                 200                 205

Leu Glu Arg Leu Lys Asn Lys Gly Ser Ser Tyr Gln Asp Trp Tyr Asn
    210                 215                 220

Tyr Asn Arg Phe Arg Arg Glu Met Thr Leu Thr Val Leu Asp Ile Val
225                 230                 235                 240

Ala Leu Phe Pro His Tyr Asp Val Gln Thr Tyr Pro Ile Thr Thr Val
                245                 250                 255

Ala Gln Leu Thr Arg Glu Val Tyr Thr Asp Pro Leu Leu Asn Phe Asn
            260                 265                 270
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Pro Lys Leu His Ser Val Ser Gln Leu Pro Ser Phe Ser Asp Met Glu
        275                 280                 285

Asn Ala Thr Ile Arg Thr Pro His Leu Met Glu Phe Leu Arg Met Leu
    290                 295                 300

Thr Ile Tyr Thr Asp Trp Tyr Ser Val Gly Arg Asn Tyr Tyr Trp Gly
305                 310                 315                 320

Gly His Arg Val Thr Ser Tyr His Val Gly Gly Glu Asn Ile Arg Ser
                325                 330                 335

Pro Leu Tyr Gly Arg Glu Ala Asn Gln Glu Val Pro Arg Asp Phe Tyr
            340                 345                 350

Phe Tyr Gly Pro Val Phe Lys Thr Leu Ser Lys Pro Thr Leu Arg Pro
        355                 360                 365

Leu Gln Gln Pro Ala Pro Ala Pro Pro Phe Asn Leu Arg Ser Leu Glu
    370                 375                 380

Gly Val Glu Phe His Thr Pro Thr Gly Ser Phe Leu Tyr Arg Glu Arg
385                 390                 395                 400

Gly Ser Val Asp Ser Phe Asn Glu Leu Pro Pro Phe Asn Leu Val Gly
                405                 410                 415

Leu Pro His Lys Val Tyr Ser His Arg Leu Cys His Ala Thr Phe Val
            420                 425                 430

Arg Lys Ser Gly Thr Pro Tyr Leu Thr Thr Gly Ala Ile Phe Ser Trp
        435                 440                 445

Thr His Arg Ser Ala Glu Glu Thr Asn Thr Ile Glu Ser Asn Ile Ile
    450                 455                 460

Thr Gln Ile Pro Leu Val Lys Ala Tyr Gln Ile Gly Ser Gly Thr Thr
465                 470                 475                 480

Val Arg Lys Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
                485                 490                 495

Gly Pro Gly Thr Phe Gly Asp Met Arg Ile Asn Ile Asn Ala Pro Leu
            500                 505                 510

Ser Gln Arg Tyr Arg Val Arg Ile Arg Tyr Ala Ser Thr Thr Asp Leu
        515                 520                 525

Gln Phe Phe Thr Ser Ile Asn Gly Thr Thr Ile Asn Ile Gly Asn Phe
    530                 535                 540

Pro Lys Thr Ile Asn Asn Val Asn Pro Leu Ser Ser Glu Ser Tyr Arg
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545 550 555 560

Thr Val Ser Phe Ser Thr Pro Phe Ser Phe Ser Asp Ala Gln Ser Ile
565 570 575

Phe Arg Leu Gly Ile Gln Ala Phe Ser Gly Val Gln Glu Val Tyr Val
580 585 590

Asp Lys Ile Glu Phe Ile Pro Phe Glu Val Gly Phe Asn Asn Thr Ile
595 600 605

Leu Glu Ala Glu Tyr Asn Leu Glu Arg Ala Gln Lys Ala Val Asn Ala
610 615 620

Leu Phe Thr Ser Thr Asn Gln Leu Gly Leu Lys Thr Asn Val Thr Asp
625 630 635 640

Tyr His Ile Asp Gln Val Ser Asn Leu Val Thr Tyr Leu Ser Asp Glu
645 650 655

Phe Cys Leu Asp Glu Lys Arg Glu Leu Ser Glu Lys Val Lys His Ala
660 665 670

Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Ser Asn Phe Lys
675 680 685

Asp Ile Asn Arg Gln Pro Glu Arg Gly Trp Gly Gly Ser Thr Gly Ile
690 695 700

Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val Thr Leu
705 710 715 720

Ser Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln Lys Ile
725 730 735

Asp Glu Ser Lys Leu Lys Ala Phe Thr Arg Tyr Gln Leu Arg Gly Tyr
740 745 750

Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr Asn Ala
755 760 765

Lys His Glu Thr Val Asn Val Pro Gly Thr Gly Ser Leu Trp Pro Leu
770 775 780

Ser Ala Gln Ser Pro Ile Gly Lys Cys Gly Glu Pro Asn Arg Cys Ala
785 790 795 800

Pro His Leu Glu Trp Asn Pro Asp Leu Asp Cys Ser Cys Arg Asp Gly
805 810 815

Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp Ile Asp Val
820 825 830

Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val Ile Phe Lys
835 840 845

Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu Glu Phe Leu
850 855 860

Glu Glu Lys Pro Leu Val Gly Glu Ala Leu Ala Arg Val Lys Arg Ala
865 870 875 880

Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys Leu Glu Trp Glu Thr Asn
885 890 895

Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu Phe Val Asn
900 905 910

Ser Gln Tyr Asp Gln Leu Gln Ala Asp Thr Asn Ile Ala Met Ile His
915 920 925

Ala Ala Asp Lys Arg Val His Ser Ile Arg Glu Ala Tyr Leu Pro Glu
930 935 940

Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu Glu Leu Glu
945 950 955 960

Gly Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg Asn Val Ile
965 970 975

Lys Asn Gly Asp Phe Asn Asn Gly Leu Ser Cys Trp Asn Val Lys Gly
980 985 990

His Val Asp Val Glu Glu Gln Asn Asn Gln Arg Ser Val Leu Val Val
995 1000 1005

Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val Cys Pro
1010 1015 1020

Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu Gly Tyr
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Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn Thr Asp
1040 1045 1050

Glu Leu Lys Phe Ser Asn Cys Val Glu Glu Glu Ile Tyr Pro Asn
1055 1060 1065

Asn Thr Val Thr Cys Asn Asp Tyr Thr Val Asn Gln Glu Glu Tyr
1070 1075 1080

Gly Gly Ala Tyr Thr Ser Arg Asn Arg Gly Tyr Asn Glu Ala Pro
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Ser Val Pro Ala Asp Tyr Ala Ser Val Tyr Glu Glu Lys Ser Tyr
1100 1105 1110

Thr Asp Gly Arg Arg Glu Asn Pro Cys Glu Phe Asn Arg Gly Tyr
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Arg Asp Tyr Thr Pro Leu Pro Val Gly Tyr Val Thr Lys Glu Leu
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Glu Tyr Phe Pro Glu Thr Asp Lys Val Trp Ile Glu Ile Gly Glu
1145 1150 1155

Thr Glu Gly Thr Phe Ile Val Asp Ser Val Glu Leu Leu Leu Met
1160 1165 1170

Glu Glu
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